the OIL AND GAS JOURNAL

OCTOBER 28, 1957

Why a Nervous Market Needn't Scare Oil

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How the Government Is Gunning for Pipelines

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2 New Drilling Tools . . .

1. Improved Thinner for Gyp Muds p. 93

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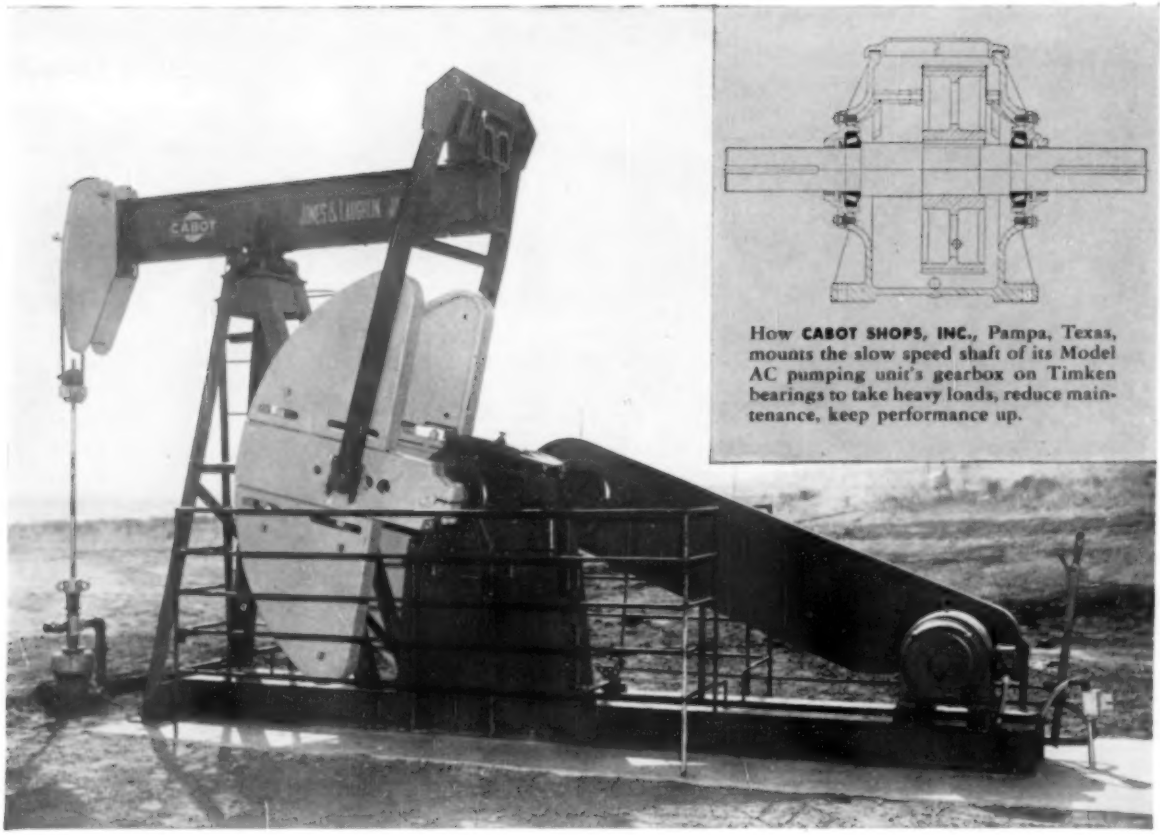

How **CABOT SHOPS, INC.**, Pampa, Texas, mounts the slow speed shaft of its Model AC pumping unit's gearbox on Timken bearings to take heavy loads, reduce maintenance, keep performance up.

How TIMKEN® bearings on slow speed shaft keep pumping unit going in high

IN designing this Model AC pumping unit, Cabot Shops, Inc., faced some tough bearing problems for the reducer's slow speed shaft. Because Cabot reducers have herringbone gears, the bearings must position all shafts. And the bearings on the slow speed shaft must take heavy radial loads. What's more, this equipment must run for years with little attention, making it vital for the bearings to be practically maintenance-free.

To solve all these problems, Cabot engineers specified Timken® tapered roller bearings for the slow speed shaft. The tapered construction of Timken bearings lets them take *both* radial and thrust loads in any combination. And full line contact between rollers and races gives Timken bearings extra load-carrying capacity. Result: end play is minimized. Shafts are held in correct alignment. Gear wear is cut. The pumping unit works steadily, economically.

And because Timken bearings hold housings and shafts concentric, bearing closures are more effective. Lubricant stays in. Dirt and moisture stay out. Lubrication costs stay down.

Another big reason Timken bearings stand up so well is that they're made of electric furnace Timken fine alloy steel. A further guarantee of highest quality. We're America's only bearing manufacturer that makes its own steel.

Get the same precision, long life, money-saving bearings that Cabot Shops and so many other manufacturers do. Specify Timken bearings for the machines you buy or build. Look for the trade-mark "TIMKEN" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN *TAPERED ROLLER BEARINGS ROLL THE LOAD*

TRADE-MARK REG. U. S. PAT. OFF.

See the next Timken Televent hour, "The Innocent Years" over NBC-TV, Thursday night, November 21st.

The OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Oct. 28, 1957

There's still plenty of room for confidence in oil:

In wake of stock-market ups and downs, oil men should keep this clearly in mind:

Oil has experienced a year of tough problems in 1957.

But close examination of the industry both at short and long range fails to reveal serious dislocations which should jar confidence.

Another page from history is encouraging:

Oil demand rides out adjustment periods much better than the general economy. And it bounces back even better when the upturn sets in (p. 61).

Marketers had hoped for a better shake in the weather.

Forecast until November 15 calls for above-normal temperatures in the oil-heating region and heavy precipitation in region west of the Rockies.

That won't help either fuel oil or gasoline sales.

Industry needs plenty of cold, dry weather to help sell off heavy products stocks.

American Petrofina is negotiating with John W. Mecom.

It hopes to buy oil properties from the Houston oil man, who has risen to one of the nation's leading independents.

But both parties deny rumors that a $200 million deal has been completed. All they'll say is they're talking.

A 40-well Argentine deal has been landed by Texans.

Laughlin-Porter Drilling Co. of Midland has a $3 million contract to drill on Tierra del Fuego. The Texans regard the deal as a possible forerunner of others for U. S. oil men in Argentina (p. 84).

Oil still makes news in Washington:

Justice Department is turning a small army of FBI agents, lawyers, accountants loose on the nation's pipeline companies. Goal is to "restore" competition in that segment of industry (p. 66).

New import rule has been laid down by Carson. He has told refiners wanting to import for first time their quotas will depend on how much domestic demand has increased.

Definite ideas on tomorrow's business airplane are now being expressed by oil men, who are aviation's top market.

The oil industry, according to a Journal survey, wants faster planes, able to make longer flights at higher altitudes with safety. But executives also are demanding a cheaper plane that is less expensive to operate and repair.

Oklahoma's battle to force Gulf Oil Corp. to buy its full allowable is taking on greater significance.

Texas officials now admit they are watching outcome of the Oklahoma case. If Oklahoma wins, Texas may take the same course in an attempt to halt purchaser proration. This practice is expected to continue in November despite another 12-day production allowable for the month in Texas.

Texas legislators, meanwhile, are gunning for importers.

Three resolutions and a bill before the special session would:

...Ask Congress to levy $1.50-per-barrel tariff on imports.

...Direct state control board not to buy goods from any oil importer or its affiliate for state use.

...Forbid state leases to major importing firms.

...Authorize Railroad Commission to limit a company's Texas production in proportion to its imports into the U. S.

The Williston basin could overtake Paradox basin in favor of oil explorers during 1958 (p 171).

Huge and challenging Williston has spewed forth a crop of new oil fields in the last few months. The far-flung successes are proof that this region harbors a lot more oil than most operators had dared to think.

Aramco has a 3,000-bbl. daily producer in its 75-mile stepout well in the Dahana area.

The wildcat apparently extends the mammoth Ghawar producing trend to the west. Production is from the "D" member of the prolific Arab zone.

Two new drilling developments are worth noting:

New thinner is making use of "gyp" muds practical for Gulf Coast drilling. The thinner is ferrochrome lignosulfonate.

"Gyp" muds have been particularly successful in two coastal Louisiana fields where salt-water flows are common. Time and cost of mud conditioning after salt-water flows were reduced. Mud control also was made easier (p. 93).

New squeeze treatment for sealing off lost-circulation zones has proved successful.

After each of 10 treatments on three different wells, full returns were regained and drilling successfully resumed.

The new squeeze contains Attapulgate clay, barite, and lost-circulation material. Solution of these is spotted in the drill pipe, and regular mud is displaced from drill string. Squeeze mud is then pumped into the formation and allowed to set for about 12 hours.

Advantages: No special equipment is needed for pumping or mixing. It's workable and flexible and causes a hard plug but will not cause sidetracking or cave-in (p. 96).

Plastic pipe is gaining acceptance in plant uses.

Du Pont reports that in 1948 only one company was using the pipe. Now more than 60 have installations in service. These include such materials as Saran-lined pipe, polyethylene, polyvinyl chloride, and polystyrene rubber.

Chimes now alert operators to trouble in the control room at Dow Chemical's power house at its Freeport, Texas, petrochemical plant.

Advantages over the old nerve-shattering horn:

Chimes don't distract the operator when he's searching for trouble. Now Dow workmen ferret out the trouble immediately while the chimes toll.

Socony Mobil has decided to release outright its engineering know-how on eductor mixers and dedicate its patent to the public as a service to industry.

The eductor mixer is a simple device for mixing crudes in fixed-roof tanks. Basic engineering information and drawings on the mixer are detailed on p. 88.

The French are throwing $3 million into an all-out drive to start Saharan oil flowing to Mediterranean port by the first of the year.

Two spreads currently are pushing a 105-mile, 6-in. crude line from Hassi Messaoud wells to the Touggourt railhead. Other crews are reworking the 135-mile rail line from Touggourt to Biskra.

Political gains represented by Saharan oil reportedly far outweight the economics of the pipeline-railway job.

Trans-Canada Pipe Lines is pushing construction hard.

Its 1957 schedule of 1,064 miles is nearing completion.

Bids will come in this week on 851 miles of 30-in. to be laid next year. Goal for completing the 2,300-mile line from Alberta to Montreal is November 1958.

But prospects are that Trans-Canada may have to double its capacity by 1962. Company officials say present contracts will require full capacity of the line within 5 years. They are convinced demand for gas will climb so fast within 3 or 4

years they will have to start enlarging the system by looping.

Before this happens, though, the whole system will be investigated by Canada's new Conservative Government.

Prime Minister Diefenbaker has set up a study to determine if gas prices to be charged consumers are fair and if producers are getting fair returns.

Clint Murchison apparently is playing a hand in the $500 million deal for a 1,000-mile pipeline to move Iranian crude from the Qum area to the Mediterranean Coast.

Company which will build the line has been named Elburz Oil Corp. Charles E. Allen, New York investment banker, will be chairman. Frank A. Schultz, one of Murchison's right-hand men will be president. Schultz already is vice president of Canadian Delhi Taylor Oil Co. and director of Trans-Canada.

Allen & Co. will have financial control of the line. An Allen agent left for Teheran last week with a draft of special legislation needed to cement the deal with Iran.

A new type of pipeline inspection instrument is being developed by Electro Chemical Laboratories, Tulsa.

Device has an ambitious goal: Determining total pipe condition, not just corrosion or other properties.

It will inspect the pipe in place and record its condition. This will eliminate the costly, time-consuming process of digging up the pipe, cutting it, and inspecting it visually.

Cooperative underwater gathering system may be worked out soon to connect several oil fields in the gulf.

Gulf Oil Corp. is sponsoring the latest proposal and is still trying to interest other operators. Gulf is getting some support because the line is seen as one way of reducing offshore operating costs.

Most operators have their offshore production so scattered that individual gathering systems are nearly impossible.

Derby Refining now apparently is front runner in plans for a pipeline to move distress crude from southeast Kansas and northwest Oklahoma to Wichita area markets.

Two other groups have made proposals for a line, but nothing definite has emerged.

New fracturing technique is helping California producers.

It is finding greatest use where sand and silt create a tough problem.

Process is known as pressure packing. It's carried out much like a regular fracturing job. But by regulating the concentration of sand in the fluid, the treatment fractures the formation and also forms a tight sand screen between wall of formation and the casing or liner.

Good Wells Make Good News

October 28, 1957

WATER is an economical, effective fracturing fluid. It may be gelled or not. Acid may be added for treating acid-soluble formations. A wide variety of addition agents can also be added to combat emulsions, silicate swelling and other formation peculiarities. Here are some recent treatments that illustrate how Dowell engineers use water for successful fracturing under various conditions.

- **Grant County, Western Kansas** (Old Gas Well): This well was completed in the Hugoton series in 1949, and brought-in with 14,000 gallons Dowell X Acid. When deliverability declined to 423 mcfd, the operators decided to plug back into the Winfield zone and fracture the upper zones with Riverfrac*. Dowell performed the service using 80,000 gallons fresh water—*without sand.* Injection rate down casing *averaged 100 bpm. Deliverability after treatment was 1200 mcfd.*

- **Ector County, West Texas** (New Well): This well was completed in tight Clear Fork dolomite with perforations from 5696 to 5736 feet (two per foot). When well would not produce without stimulation, Dowell recommended Riverfrac with acid added. Treatment was performed using 20,000 gallons water with 5,000 gallons concentrated acid added, and 25,000 pounds sand. This was followed by a 20,000 gallon water flush, with de-emulsifying agent added. Injection was down casing at 76 bpm at 1800 psi maximum. *After treatment, well tested 360 bopd flowing. This was about three times the production of similar wells in this pay that had been fractured with oil-base or oil-and-acid fluids.*

- **Alberta, Canada** (Old Gas Well): A well completed in the Basal Quartz sand of the Morinville area had gone to water. When it was plugged back to 4,308 feet, water was shut-off, but gas production was negligible. Dowell was called to fracture with Waterfrac—using 2,100 gallons gelled water and 4,000 pounds sand, preceded by a 250-gallon spearhead of Mud Acid. *After treatment, well tested 30.5 mmcfd open flow and delivered 3.5 mmcfd to pipe line—with no water.*

- **Chase County, Eastern Kansas** (New Well): Open hole completion, 2,278 to 2,287 feet, in the Bartlesville sand near the edge of a waterflood project. Initial test revealed only show of oil. For stimulation, operator selected Riverfrac, using 31,600 gallons fresh water and 25,000 pounds sand. Well was treated down casing at 24½ bpm average injection rate. *60 days later, production had stabilized at 70 bopd.*

Part of the secret of success in using water for fracturing, is the experience of the service company you have perform the service. That's why it is important to specify Dowell. For information on the use of water for fracturing—or for service, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma.

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the OIL AND GAS JOURNAL

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211 South Cheyenne Ave.
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Phone LOngacre 4-6160

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Phone VAndike 0722

D. H. Stormont ... District Editor
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WASHINGTON OFFICE
621 Albee Building
Phone District 7-1710

Bertram F. Linz ... District Editor

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., Mount Pleasant, Mich., Melbourne, Australia; Regina, Sask.; Chatham, Ont.; Casper, Wyo., and Anchorage, Alaska.

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OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
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TECHNOLOGY—OPERATION

Refining-Processing

Mixing Liquids in Fixed-Roof Tanks . . . 88

By Robert B. Meny and Robert B. Velykis

Eductor mixers have performed satisfactorily in mixing liquids in fixed-roof tanks. Here are design details. Socony Mobil Oil Co., developer of the device, is dedicating its patent to the public as a service to the industry and is hereby releasing outright its engineering know-how on eductor mixers.

Northwest Branch Cycling Plant Is One-Man Operation . . . 98

By Larry Resen

Simplicity was the keynote behind the design of this 27,000,000-cu.-ft. plant. With only one operator per shift, an important feature of the plant is a comprehensive safety shutdown system.

Conoco's Short Junction Plant Uses Dual Cycle . . . 113

By John C. Reidel

This new Cleveland County, Oklahoma, plant highlights a small field processing trend. This is a combination refrigeration-oil absorption process cycle. The cycle provides a high degree of flexibility.

Natural-Gas Dehydration at T.G.T.'s Gabe Plant . . . 121

By A. G. Harrell

A natural-gas stream of 950,000 M.c.f. is dehydrated from water content of 7 lb. per M.M.c.f. to bone-dry stream. Some 260 tons of desiccant are used to prepare the gas stream for chilling to minus 105° F. Final liquid recovery from the plant is 440,000 gal. daily of ethane and heavier hydrocarbons.

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Drilling-Production

Gyp Muds Now Practical for Coastal Drilling . . . 93

By J. M. Hurdle

A new thinner makes possible the control of flow properties of muds containing gypsum and salt. Gyp muds are thus made practical for Gulf Coast drilling and have been used to advantage by The California Co. in this area.

New Squeeze for Lost Circulation . . . 96

By David R. Ruffin

It needs no special equipment, is more workable and flexible, and has effect of hard plug but will not cause sidetracking or cave-in.

How Fractured Limestone Responds to Water Flooding . . . 100

By W. E. Nolan and G. R. Locker

A double five-spot water flood in the Fullerton Clearfork unit, northeastern Andrews County, Texas, has reduced producing gas-oil ratios extremely and greatly increased producing rates.

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Safer Loading-Rack Operations . . . 109

By C. H. Scruggs and D. L. Hope

Here is a simple workable solution to the problem of removing static electricity from tank trucks and tank cars at product pipeline terminals.

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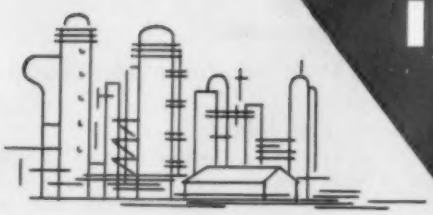
Finest

IN THE FIELD



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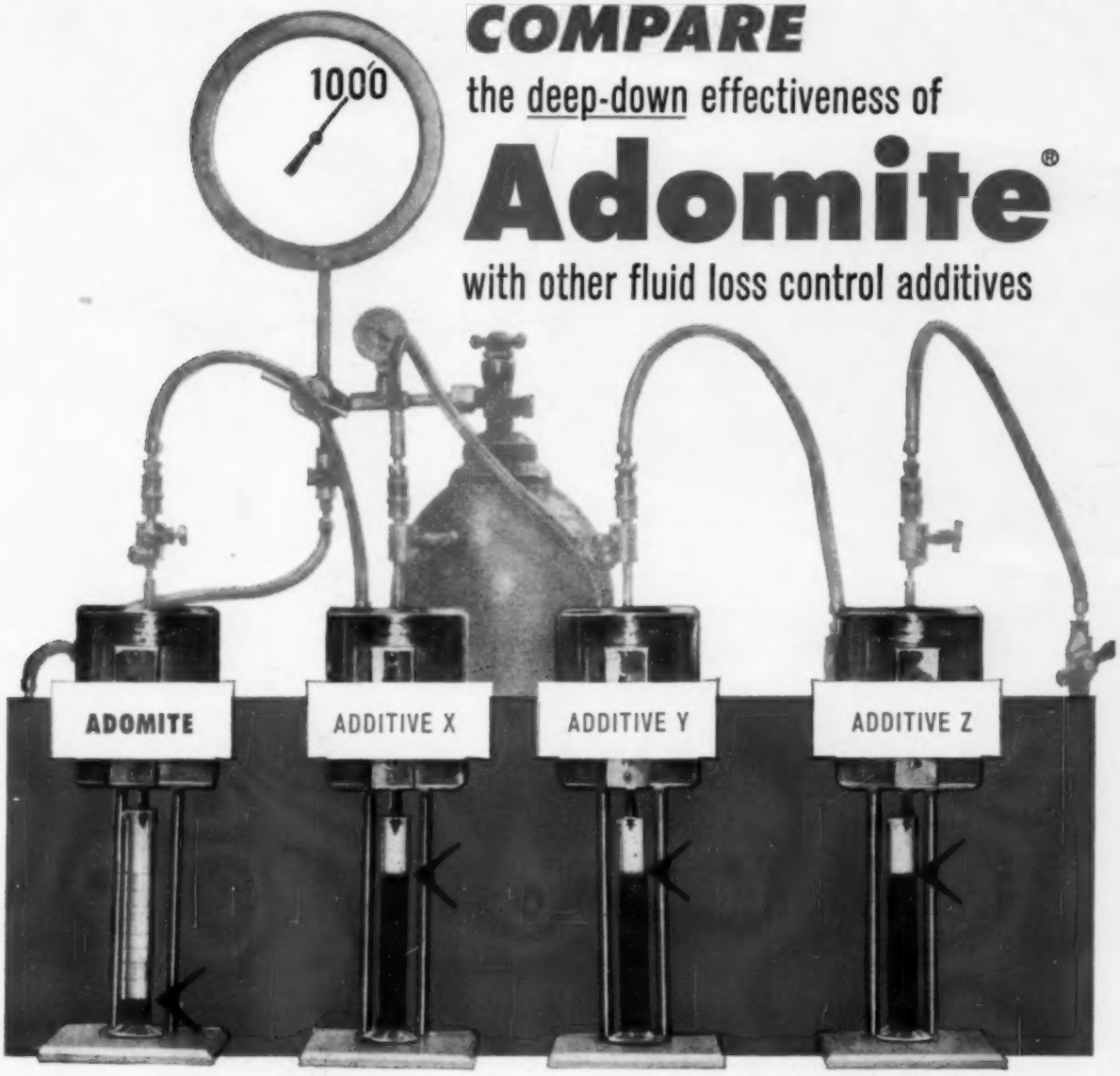

Just how effective is your present fluid loss control additive at bottom hole conditions? As you undoubtedly know, many fracturing additives show desired fluid loss control at surface conditions of low pressure and room temperature. But at bottom hole conditions, fluid loss becomes so high that their effectiveness is lost. Compare them with Adomite. Tests show that, *deep down*, nothing safeguards your profits like Adomite.

What makes the difference?

Adomite, when mixed with oil, disintegrates into millions of tiny particles. These particles seal the face of the formation and keep the fracturing fluid from filtering in. Temporarily sealing the formation, Adomite particles do not plug it.

Other additives, too, contain sealing particles, but these tend to soften or dissolve as temperatures increase. Result: fluid loss control is greatly reduced.

	Fluid Loss at Surface Conditions— 100 psi,* 75°F., cc/30 min.	Fluid Loss at Bottom Hole Conditions— 1000 psi, 150°F., cc/30 min.
ADOMITE + crude oil	**2.2**	**22.0**
Additive X + crude oil	**37.8**	**Infinite**
Additive Y + crude oil	**8.5**	**Infinite**
Additive Z + crude oil	**13.0**	**295 (1 min., 50 sec.)**

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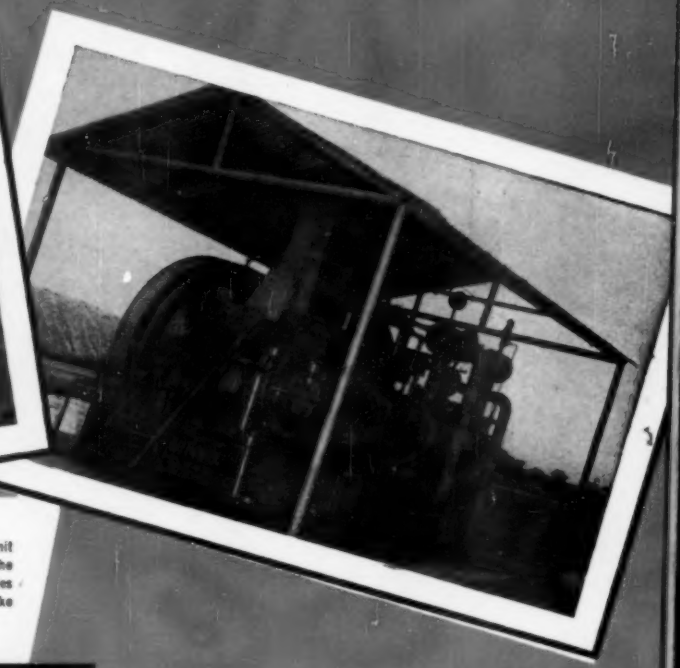
(*Standard API Code 29 Test)

To get best results downhole with straight crude, gelled crude or refined oil, always *specify* Adomite.

FRACTURE WITH ADOMITE

Any way you look at it-



This Model OWL-50 two-stage unit was first set up as a single-stage unit for gas lifting one well near Refugio, Texas . . . then later moved to the Hobson Field and changed over to two-stage operation. It now handles about 250,000 cubic feet of gas per day with approximately 30 psi intake and 580 psi discharge pressures as part of a 15-well gas-lift system.

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UNITIZED CONSTRUCTION—Two-cycle, single-cylinder, wet-liner-type Lorain gas engine drives the compressor directly from the extended end of the engine crankshaft. Both units are mounted side-by-side on a strong cast-iron sub-base and working parts are fully enclosed in a heavily-ribbed one-piece frame, requiring minimum protection from the weather. Radiator for cooling both units, together with safety controls, etc. are mounted integrally.

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B
C
D
A Helix of flat, noncorroding, galvanized steel wire plus ply of heavy fabric coated with oil-resistant compound
B Tube of gasoline- and oil-resistant synthetic rubber
C Reinforcing plies of heavy fabric plus helix of round steel wire
D Oil-, age-, abrasion- and weather-resistant cover

Nearly three times the service — and still going strong!

Tankers are serviced very rapidly at this Texas dock. Standard operation is to load 138,000 barrels of gasoline in just 10 hours. Also standard is a test of the hose at periodic intervals to determine whether it can continue in service handling the highest test petroleum products or whether it should be relegated to low pressure, bunker or utility service.

Over eight years ago, the G.T.M.—Goodyear Technical Man – specified his Style WH Oil Suction and Discharge Hose for this service. At last report, this husky, 150-pound working pressure hose had repeatedly passed the high requirements of the exacting periodic tests and was well on its way toward delivering three times the expected service, handling gasoline, aviation gasoline, and solvents under high pressure.

If you're looking for the unusual in oil hose life, why not look up the G.T.M.? You'll find he carries a complete line of oil hose from which to specify the right types for your needs at lowest end cost. And he's readily available through your Goodyear Distributor or:

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How gleaming aluminum buildings rise from red mud

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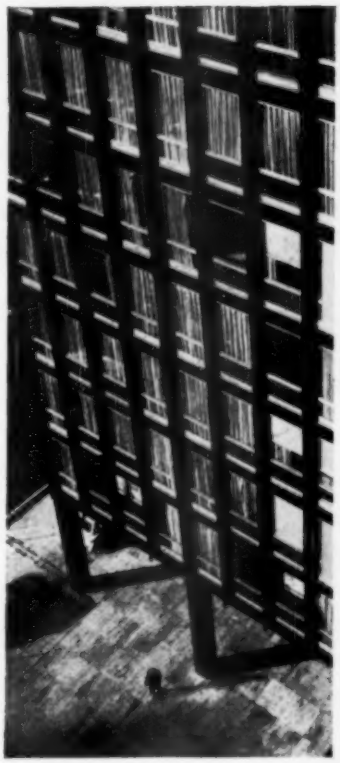
High on any list of today's versatile, economical building materials you find aluminum and its alloys. Plate, sheet, rolled forms, extruded sections, tubing, wire, rod—forged, stamped, spun—this wondrous metal answers architects' aspirations, fabricators' requirements and users' needs.

With aluminum, as is so often true, the basic raw material is found in nature wildly mixed with other mineral compounds. Bauxite must be carefully purified to provide alumina, the effective starting point for aluminum. Here again, we're happy to report, major producers turn to Columbia-Southern.

Finely ground bauxite is digested with an alkaline solution, under pressure and heat. Treatment with the alkali separates bauxite into sodium aluminate (just several short steps this side of alumina) and a sludge of impurities called "red mud." No other chemical product known effects this necessary and delicate process so well, so economically as soda ash.

Columbia-Southern supplies soda ash to hundreds of producers of non-aluminum goods, too. A personal talk, call or wire can bring tank cars of chlorine, soda ash or other basic alkalies and specialty products to your siding with a speed that will probably amaze your own Traffic Department. Why not contact Columbia-Southern today, while the thought's still fresh?



900 Esplanade Apartments, Chicago—a new concept in multi-story exteriors making extensive use of aluminum supplied by Reynolds Metals Company. Architect: Ludwig Mies van der Rohe

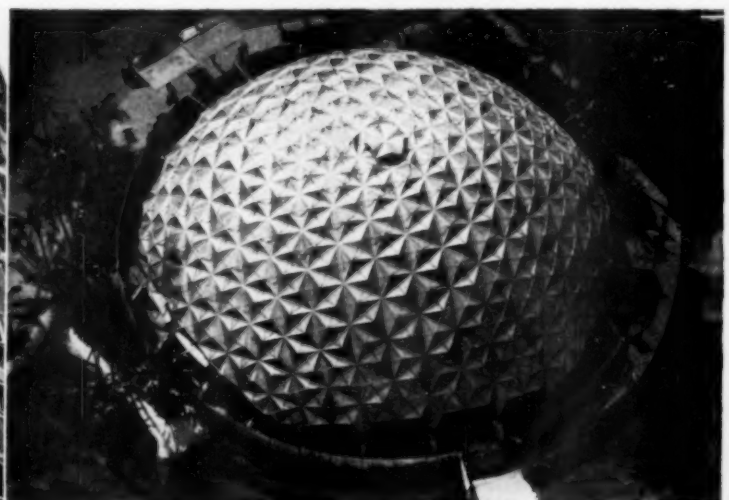
COLUMBIA-SOUTHERN CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

chemicals at work

CHLORINE, ALKALIES AND RELATED CHEMICALS
OFFICES IN PRINCIPAL CITIES
IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

The Alcoa Building, world's first aluminum skyscraper, headquarters of the Aluminum Company of America, Pittsburgh, Pennsylvania. Architects: Harrison & Abramowitz.

Aluminum-domed auditorium, first structure of its kind to be built, graces the Hawaiian Village Hotel in Honolulu. Designed by Kaiser Aluminum & Chemical Corporation.

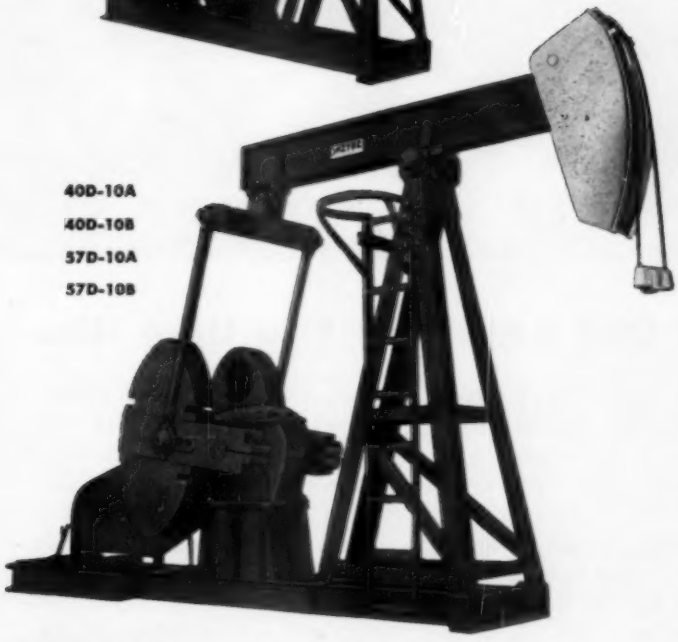


ONE little, TWO little... ...

now AZTEC makes... 3

16D-5B
25D-5B

25D-7B



40D-10A
40D-10B
57D-10A
57D-10B

Here it is! The new model 10 Aztec Pumping Unit. Aztec's rapid expansion of its new line of pumping units makes available to you through your supply store the Model 10 with two reducer sizes, 40,000 and 57,000 inch pounds API peak torque, and with adjustable counterbalance cranks or combination beam and crank counterbalance. These units, backed by years of experience, assure you low cost pumping service for years to come.

The New Model 10 Gives You All These Features:

- Floor Clearing Adjustable Counterbalance Cranks, or Counterweight Cranks and Beam Counterbalance
- Rigidly Braced, Four Legged Samson Post
- Bronze Saddle Bearings, Roller Equalizer Bearings
- Swing-Back Arc Type Hanger With Vertical Adjustment
- Wrist Pin Ejected Hydraulically
- Heavy Cast Iron Slide Rails
- Herringbone Gear Reducer with Positive Bearing Lubrication
- Roller Bearings Designed for Over 100,000 Hours B-10 Life
- Powerful Band Type Brake

THREE New Pumping Units

to Outperform the Best.....

AZTEC
MANUFACTURING CO.

2901 W. Pafford Street P. O. Box 11427
Fort Worth, Texas

He's Ready to Hammer Out Anything You Give Him

When this photograph was taken in the Bethlehem drop-forge shops, the operator was pounding out an order of steam-trap bodies. Right after he finished, there was another job waiting for him to handle. It bore no relation to steam-trap bodies, nor did the forgings he made in the several weeks that followed. No two jobs were alike.

A Bethlehem forge-shop man is prepared for all designs. He's ready for anything. Once in action, he makes those hammers and presses dance, and they dance to his tune. He's a man who knows his craft.

That's one of the reasons why Bethlehem closed-die forgings are unexcelled anywhere. Other vital factors are quality steel, an alert metallurgical service, and first-class treating and inspection facilities. All of these Bethlehem has. Whenever you need closed-die forgings ranging from one to 250 lb, we suggest you call us. We'll cooperate fully.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

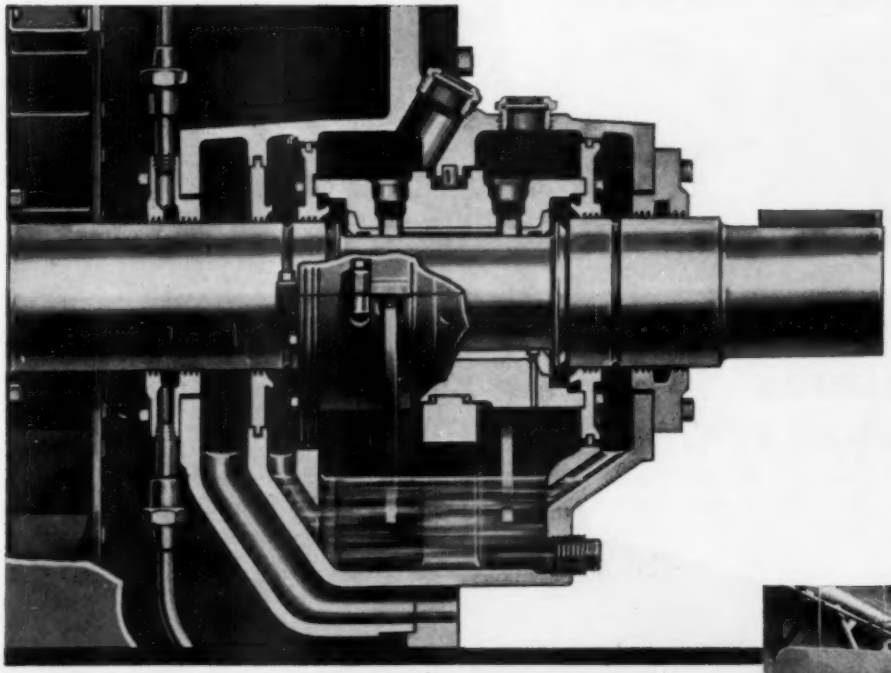
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

One of many reasons why **ALLIS-CHALMERS MOTORS** operate dependably in the

PETROLEUM INDUSTRY



Pump drives for oil well flooding service.

Motor Bearing is "extra sealed" with vent

A VENT is seldom a seal . . . but it is in this high speed Allis-Chalmers motor.

Just in case any oil or oil vapor might pass out of the bearing enclosure through the regular seals it can never reach the motor interior. Instead, it enters an annular chamber at the rear of the bearing housing. Pressurized air from the motor fan region is introduced into this pressure chamber and is vented to atmosphere. Positive protection is provided.

Accessible, Too!

Many man-hours in maintenance are saved because the motor can be inspected and maintained without opening or disturbing the bearing itself. It is only necessary to remove the upper half of the split end shield.

For details on these and other features of Allis-Chalmers motors, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

A-5476

Halliburton Dump Bailer Service is designed to furnish the necessary tools and materials for effective remedial oil well service with a minimum of delay and a resulting saving of costly rig time. Plug back jobs, bridge plugs below damaged pipe, shot tamps, water shut off, seal for bridge plugs—these and other remedial applications are performed by this specialized Halliburton service to save you money, time and trouble.

The bailers used to give you this better service are special light aluminum alloy sections which when run on sand line can place four sacks of cement or 36 gallons of other slurries at one run. If more material placement is needed and drilling line is available, it is possible to place up to ten sacks of cement or 60 gallons of other slurries at one run on special order. With special equipment using the same type bailer, Braden Head squeeze jobs can be successfully completed. The full opening bailer bottom allows materials to be discharged in a body, preventing contamination. With these Halliburton advances, more dependable and economical service can be provided than with the old method of trying to make a plug with only one or two sacks at a time.

For fast and skillful service on your remedial cementing needs, call on Halliburton Dump Bailer Service. You'll find that expensive down time can be kept to an absolute minimum.

HALLIBURTON

OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

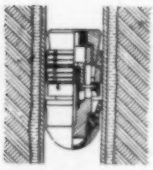
THESE EFFECTIVE HALLIBURTON TIME-SAVERS HELP TO REDUCE COSTLY RIG EXPENSE:

Hydromite

Hydromite is a waterproof plastic cement, composed of a special gypsum cement and a powdered resin, especially adapted for dump bailer service. The setting time can be controlled to very close limits and the initial set takes place in from 75 to 100 minutes. It will set in temperatures ranging from 60° to 180°F. Within ten or fifteen minutes after the initial set, Hydromite has a compressive strength of approximately 1,500 psi which permits further dumping of material in the well. Full strength (approximately 4,000 psi) is obtained in from three to twenty hours, depending upon the well temperature.

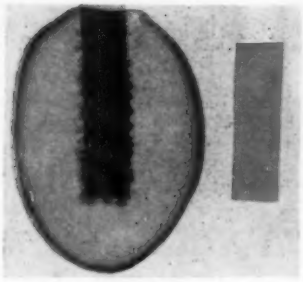
"DB" Bridging Basket

"DB" Bridging Basket is an efficient umbrella type that will bridge holes from 4½" to 15" I.D. in casing or open hole. The drillable basket has been used successfully on hundreds of dump bailer jobs and has shown its efficiency in wells exceeding 13,000 feet in depth. The "DB" Bridging Basket as shown in open position, forms a dumping bridge for additional materials and saves time in isolating formations, locating and repairing casing leaks, squeezing, acidizing and other operations.



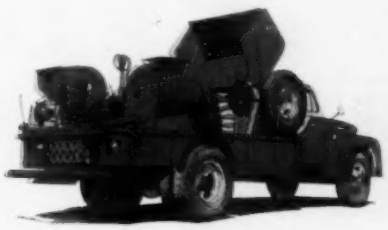
Limit Plug

Limit Plug is used to form a bridge in casing to stop or limit the downward travel of a dump bailer, gun perforator or well fluid to the point in the casing where it is set. Many successful services are economically accomplished through the use of this tool. All parts are drillable, but of sufficient strength to hold squeeze pressures up to 2,000 psi applied from above. The limit plug is not designed to stop or limit upward movement of fluids.



Resin-Cement

Resin-Cement is a slurry composed of portland, high-early or retarded cement, water and thermo-setting resins, suitable for application in wells with temperatures ranging from 80° to 230°F. It is designed for open bottom hole plugs, setting around casing shoe or opposite water zones, and other remedial work on oil or gas wells, particularly where ordinary cementing materials fail. The set Resin-Cement is permanent in nature, is not subject to attack by oil, gas or salt water, and will resist the action of common acids. With these qualities, any proven plug or shut-off should be permanent and impermeable.

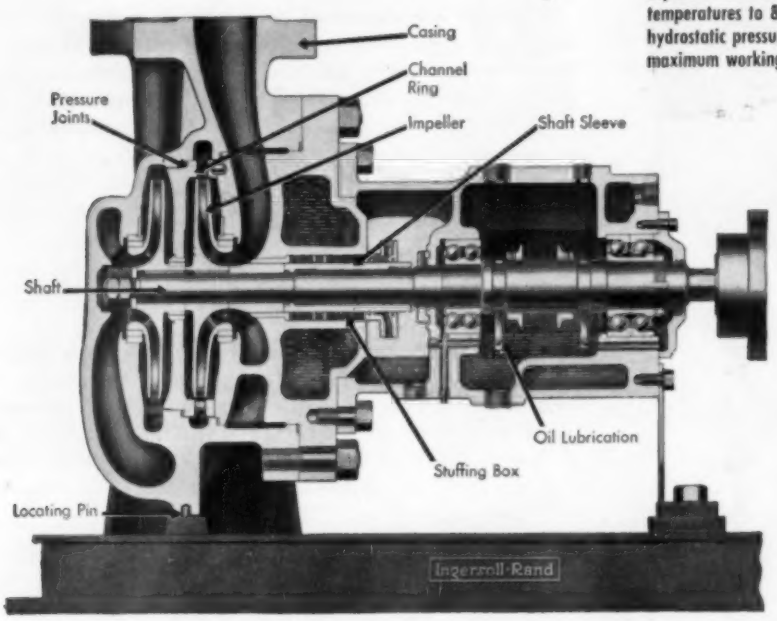


DUMP BAILER SERVICE

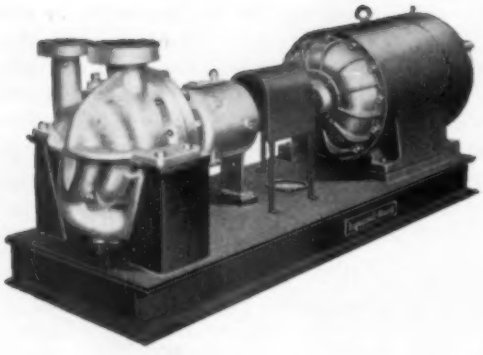
"AROUND THE CLOCK—AROUND THE WORLD"

Two-stage Ingersoll-Rand process pumps . . . Class EGT

sizes 1½, 2 and 3 inches . . .
heads to 925 ft. . . .
capacities to 400 gpm . . .
temperatures to 800°F.
hydrostatic pressure tested to 1200 psi
maximum working pressure . . . 600 psi



designed for hot liquids at high heads



The Class EGT pump described here is one of the many models Ingersoll-Rand builds for process applications. This unit is an overhung, two-stage, single-suction, diffusor – volute type pump with oil-ring lubricated ball bearings. Like all other I-R process pumps, it is built in accordance with latest API specifications. Some of the major features that make the EGT a dependable pump with long-range economy are:

Pump pulls apart from back end . . . vertically-split casing design and spacer type coupling permits dismantling for service or inspection without disconnecting piping or driver.

Center Line Support and Casing locating pin . . . centered at the hot-end of the pump casing, prevent pump from moving in any direction except axially due to expansion encountered on high temperature service . . . thus perfect alignment is assured at all times.

Stuffing box . . . is under suction pressure at all times. It is extra deep to allow packing to be arranged to suit the application. Depending upon the service, single or double mechanical seals can be furnished if desired.

If the EGT or any of the many other standard process pumps do not meet your specific requirements, Ingersoll-Rand has the experience and facilities to design and build a pump for your particular application. For further information call or write the nearest I-R branch office.

Ingersoll-Rand
11 Broadway, New York 4, N. Y.

10-653

COMPRESSORS • TURBO BLOWERS • CONDENSERS • AIR TOOLS • PUMPS • DIESEL AND GAS ENGINES

we can show you the forest

<u>because</u> of the trees

Many times oil men feel they are in a poor position financially simply because they can't see the entire picture of their operations. Caught in the complexities of their day-to-day activities, they are unable to survey their properties in a realistic, objective manner. And as a result, many times they end up working for their creditors.

Increased operating costs spell falling profits. And that means trouble. While there is no short cut way out of this problem, The Commerce working with your legal and tax counsel can many times show you how to increase profit by reducing costs. Tighter managerial control, an analysis of costs, and recommendations for changes have increased the profit of other oil men. If your problems are similar, come to the bank that actually does know the oil business and that can help you.

E. O. Buck, vice president, Oil Loan Department

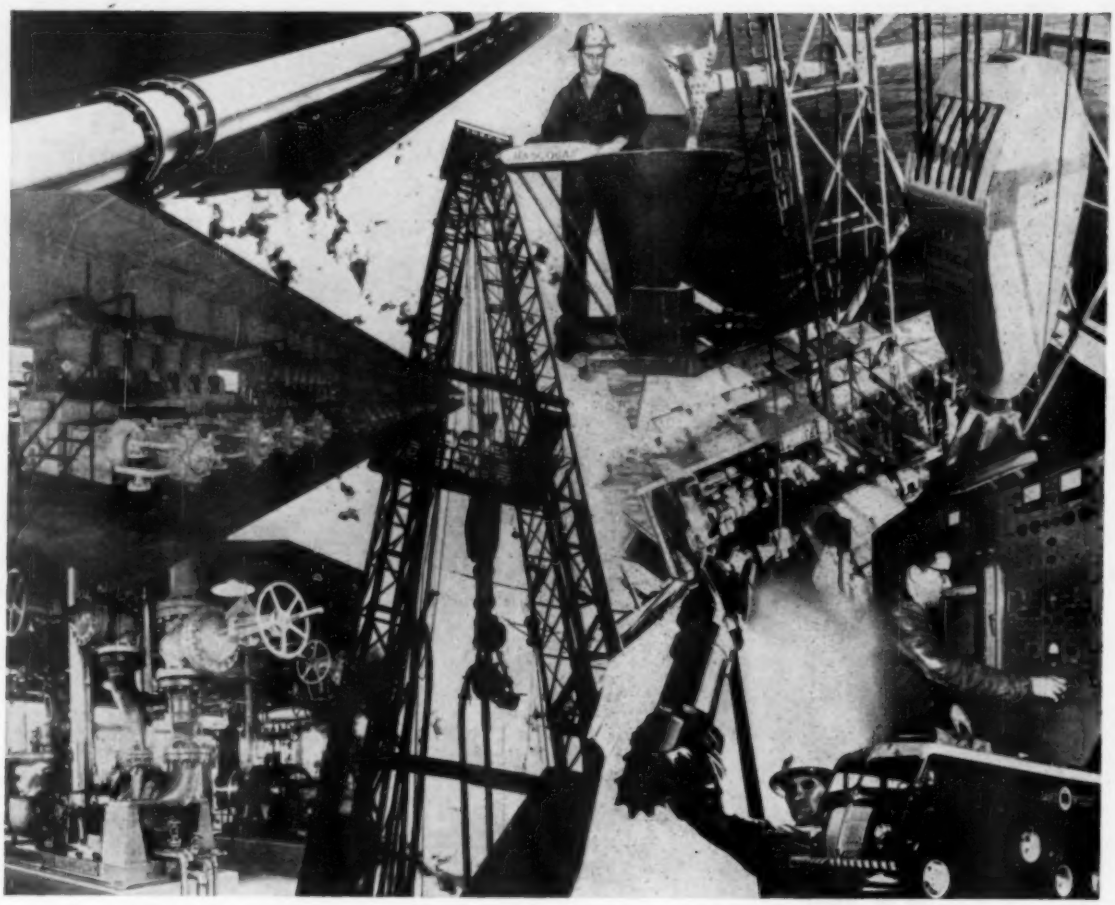
Member Federal Deposit Insurance Corporation

THE NATIONAL BANK OF

COMMERCE

Gulf Building, Houston, Texas **OF HOUSTON**

Facilities of The National Bank of Commerce Oil Loan Department are available in Wyoming, Nebraska, Colorado, New Mexico, Texas, Louisiana, and Mississippi.



Tomorrow's Progress Planned Today

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA

28th ANNUAL MEETING

Statler Hilton Hotel
Dallas, Texas
October 27-29, 1957

DRESSER salutes members of the Independent Petroleum Association of America for their many important contributions to the great progress of our vital oil and gas industries.

THE DRESSER INDUSTRIAL TEAM SERVES THE GROWING OIL

the Dresser Badges of Merit plus+

CLARK

CLARK BROS. CO., Olean, New York—Gas turbines, engines, and reciprocating, centrifugal and axial flow compressors—gas, steam, electric and diesel driven.

DRESSER IDECO

DRESSER-IDECO COMPANY, Columbus, Ohio—Radio and television broadcasting towers, steel buildings, aircraft hangars, electric power substations.

DRESSER MANUFACTURING DIVISION

DRESSER MANUFACTURING DIVISION, Bradford, Pa.—Pipe line couplings, pipe repair sleeves and clamps, weldments, forgings, welding fittings, flanges, rings.

GUIBERSON

THE GUIBERSON CORPORATION, Dallas, Tex.—Swabs, packers, anchors, workover equipment—drilling heads, blowout preventers, tubing blocks, hooks, swivels, kellys, savers, unions. Gas lift equipment. Molded rubber products.

IDECO

IDECO, Dallas, Tex.—Hydrair* and Power Rigs; Full-View* Masts; substructures; single, dual and Drive-In Rambler Rigs; blocks, swivels, rotaries; mud pumps; petroleum equipment and supplies.

LANE WELLS

LANE-WELLS CO., Los Angeles, Calif., Houston, Tex., Oklahoma City, Okla.—Electric and Radioactivity Well Logging, Koneshot* perforating and bullet perforating, packers and bridging plugs.

Magcobar

MAGNET COVE BARIUM CORP., Houston, Tex.—Magcobar* and Magcogel* drilling muds and other specialized oil well drilling fluids and chemicals.

PACIFIC

PACIFIC PUMPS, INC., Huntington Park, Calif.—Centrifugal pumps for refineries, power stations, pipelines, and chemical plants; plunger pumps for oilwells.

ROOTS-CONNERSVILLE

ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind.—Rotary positive blowers, gas pumps, centrifugal blowers, exhausters, vacuum pumps, and positive displacement meters.

Security

SECURITY ENGINEERING DIVISION, Dallas, Tex., Whittier, Calif.—Rock bits, reamer rock bits and hole openers; reamers, casing scrapers and Neo-Red rubber stabilizers.

SIE

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO., Houston, Tex.—Seismograph systems and instruments—electronic, electro-mechanical. Computers—analog and digital; recording systems. Special transformers, reactors.

WELL SURVEYS

WELL SURVEYS, INC., Tulsa, Okla.—Nuclear and electronic research and development for the petroleum and other industries. Originators of radioactivity logging.

*Registered

put this DRESSER plus+ team to work for you!

You receive a bonus of extra value whenever you are served by any one of the Dresser companies. *Men with imagination* provide the research, engineering, manufacturing and service applications for the particular specialties of each Dresser operating unit. All Dresser companies work together with their combined experience and facilities to form the world-wide Dresser industrial team. This inter-company teamwork offers a bonus in greater experience and technical knowledge – backed by the extensive Dresser facilities – in the customer's specific industry. This intangible but important factor is known the world over as the Dresser plus+ ... the mark of superior equipment and services for the oil, gas, chemical, electronic, and general industry.

Dresser's world-wide engineering experience in many industries plays a major role in the creation of new developments and improved technological methods. No other single company provides the same broad range of equipment and services. The Dresser plus+ is a symbol for the superior quality of equipment and technical services which have become the standard of comparison in industries the world over!

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EQUIPMENT AND TECHNICAL SERVICES

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CHEMICAL
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POST OFFICE BOX 718 • REPUBLIC NATIONAL BANK BUILDING • DALLAS 21, TEXAS

GAS, CHEMICAL AND ELECTRONIC INDUSTRIES — EVERYWHERE

Important? Yes...but definitely no secret

EVERYONE IN PIPELINING KNOWS ABOUT GASO

Talk to anyone active in pipelining about GASO Pumps and he'll tell you they're such a familiar sight in the field that pipeliners think of them as standard equipment. It's a reputation based on performance that would be hard to believe were it not confirmed by accurate cost records. We're as close to you as our nearest distributor.

Fig. 2651-2652 — Gaso 12" stroke Duplex Piston Power Pump. Largest of Gaso models designed to pump oil or water through long lines at pressures from 475 to 1500 psi.

DISTRIBUTORS

W. L. SOMNER COMPANY, Shreveport, Louisiana • Odessa, Texas • Tinsley, Mississippi • Brookhaven, Mississippi

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GASO PUMP & BURNER MFG. CO.

TULSA, OKLAHOMA

EXPORT OFFICE: 149 Broadway, New York

GASO PUMPS

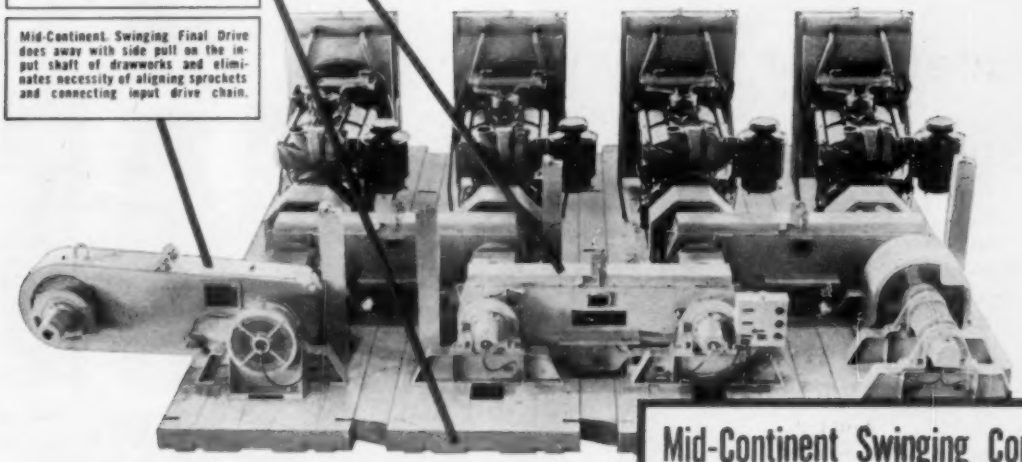
for every oil industry need

Exclusive Swinging Compounds make moves possible without opening compound cases, draining oil, or "breaking" chains. Dust-proof, oil-tight compound cases are of heavy welded construction. Chains are lubricated from individual oil pumps.

Extra-heavy, four-runner skidded units are within eight-foot highway width limits and have dowel pin connections for perfect alignment.

Mid-Continent Swinging Final Drive does away with side pull on the input shaft of drawworks and eliminates necessity of aligning sprockets and connecting input drive chain.

MID-CONTINENT
AE RIG DRIVE



Compounds Swing
for easy moving... quick rig-up!

Designed for most any engine—drawworks combination, the Mid-Continent AE Rig Drive helps keep non-rotating time to a minimum. Exclusive *Swinging Compounds on all Mid-Continent AE Rig Drives simplify moves and rig-up. Within minutes, compounds can be swung from operating position to vertical locked position for moving, or from vertical to horizontal for drilling. Swinging Final Drive (input to drawworks), specified for many installations, adds still more to the versatility of this practical and dependable Rig Drive. See your Mid-Continent representative today about a Mid-Continent AE Rig Drive for your rig.**

*Patented

Mid-Continent Swinging Compound*
Proved in 10 Years
World-Wide Service

1947

1951

1955

1957

In 10 years of world-wide service, the Mid-Continent Rig Drive has proved its superiority of design in practical multiple engine drive applications. More than 100 Mid-Continent Rig Drives have been specified by oil companies and drilling contractors for their world-wide drilling operations.

MID-CONTINENT SUPPLY COMPANY

MID-CONTINENT BLDG.
FORT WORTH, TEXAS

Export Division: 45 Rockefeller Plaza, New York 20, N. Y., Cable: MIDCUMPORT NYK

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

New specialized off-highway V-8's

Another reason why you'll find International Trucks cost least to own!

A new six-wheeler designed exclusively by INTERNATIONAL for heavy-duty off-highway work—with the most powerful truck-type engine in any comparable truck. Tough, husky construction to perform profitably under the most rugged conditions!

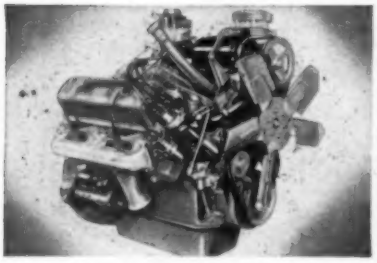
Here is more evidence of the INTERNATIONAL policy to build the trucks that operators want and need . . . trucks with only the highest quality components, the biggest selection of components to stay on the job longer at *least* cost. And INTERNATIONAL Trucks do cost *least* to own—fleet owners' cost records prove* this.

Why not get proof yourself? See or call your INTERNATIONAL Dealer for all the facts. Do it today.

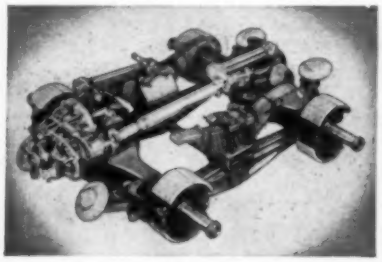
**Signed statements in our files, from fleet owners throughout the U.S., back up this statement.*

INTERNATIONAL HARVESTER COMPANY, CHICAGO

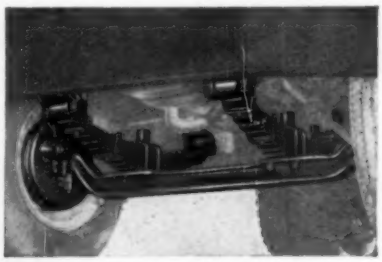
Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors



1 **Most V-8 power in any truck,** 257 hp. New heavy-duty VF-230 models have load-moving ability unlimited, power to haul the biggest loads. Other six-wheeler engines include sixes and new V-8's—gasoline, LPG and diesels up to 356 hp.

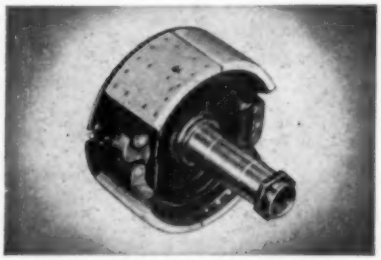


2 **INTERNATIONAL tandems** give longer, more dependable life. This heavy-duty, double reduction unit has 50,000 lbs. capacity. Sturdy cast steel housings. Third differential with lock transmits power smoothly and evenly to each axle.



3 **Balanced heavy-duty front end** for maximum loading, added stability and longer life. 15,000 lbs. capacity heat-treated high carbon steel axle, 4-inch wide springs, threaded pins and bushings. Built to take the big jobs in stride.

4 **INTERNATIONAL steel-flex frames** combine great strength with proper flexibility. New models have deep, double channels made of heat-treated alloy steel. Reinforced cross-members with husky gussets for sturdy, lasting tandem suspension.



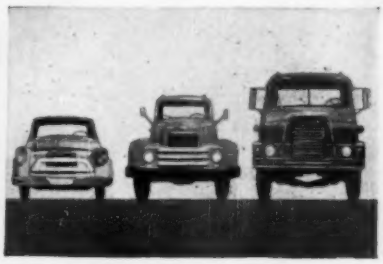
5 **Efficient, fast-acting air brakes** are standard on heavy-duty VF-230—17½ in. x 3 in. front, 16½ in. x 7 in. rear with 1,162 sq. in. total lining area. Other six-wheel models with brake types and sizes to match load and operation *exactly*.

6 **True geometric steering** provides easier handling and outstanding maneuverability. Heavy-duty gears are cam and roller-mounted twin lever type. Controls mounted *ahead* of the front axle. Power steering standard on this new model.

Another addition to the world's most popular line of six-wheel trucks – new INTERNATIONAL heavy-duty VF-230 with 60,000 lbs. GVW. Built to absorb severe shock loads, to stand up under the most extreme applications. Engine is the industry's most powerful V-8, *257 hp.* Other V-8 six-wheelers available, plus models from 22,000 to 76,800 lbs. GVW in conventional and COE design. Complete selection of all-wheel-drive models, too.

7 Heavy-duty, functional construction. Fenders are 12 gauge diamond tread steel plate, welded and reinforced for extra strength and long life. Massive, sturdy bumpers and guards. Rugged reinforced support for front tow pin.

8 INTERNATIONAL also offers a complete line of all-wheel drive models for the tough, off-highway operations. Completely factory-built, 7,000 to 43,000 lbs. GVW. Low height with ample ground clearance. Complete selection of equipment available.

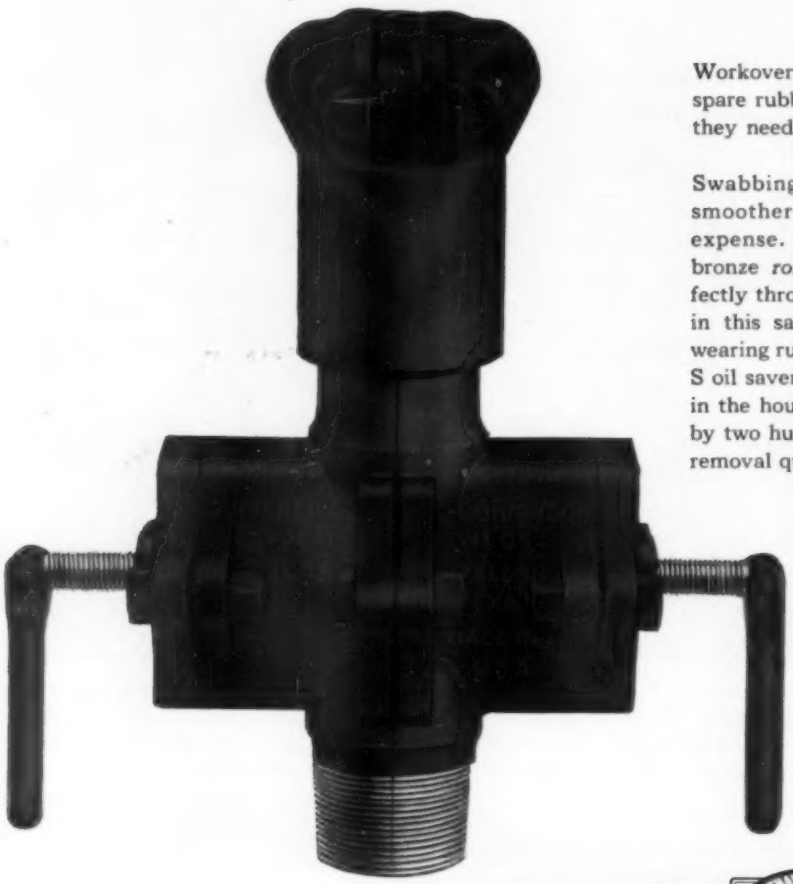


9 World's most complete line. There is an INTERNATIONAL "tailor-made" for *every* job, half-tonners to 96,000 pounders. Choice of 4-wheel, 6-wheel and all-wheel-drive models, conventional and COE design. Every one built to cost *least* to own!

LONG TIME BETWEEN CHANGES!

When You START Using Guiberson's

Type U Wire Line Oil Saver



Workover crews tell us they keep fewer spare rubbers on the rig for this saver — they need changing so seldom.

Swabbing operations go along a lot smoother with less trouble and less expense. Three durable special alloy bronze *rollers* center the wire line perfectly through the saver. And the rubbers in this saver are the same large, long-wearing rubbers used in Guiberson's Type S oil saver — they won't extrude or stick in the housing. Split-type housing, joined by two husky bolts, makes installation or removal quick and easy.

Use the Type U singly, or in tandem leaving off the roller cap on the lower saver. When you do need them, get Guiberson replacement rubbers packed two pair to a blue and yellow box.

Get the Best — Get Guiberson.

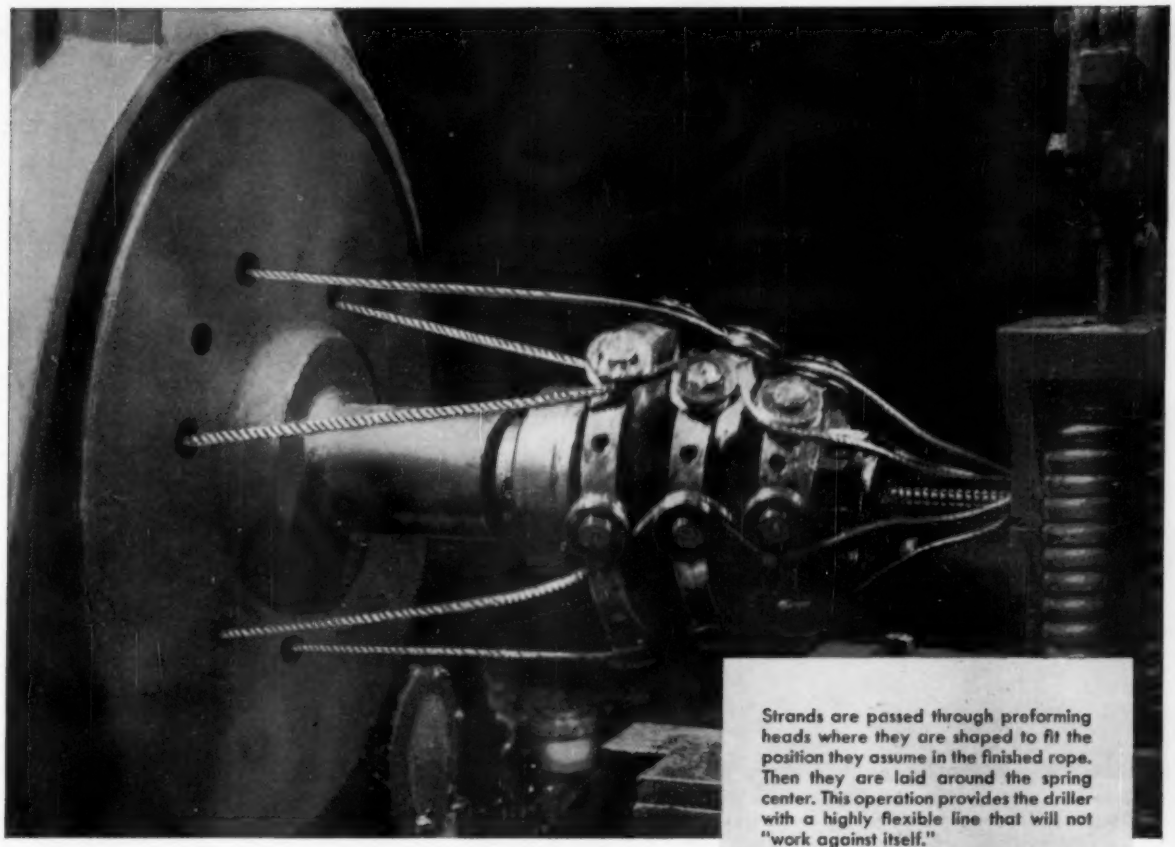
Available in 2" or 2½" EUE 8 round double pin sizes and 3" 8V line pipe or 3" EUE 8 round double pin sizes for ⅜"-⅝", ½"-⅝" or ¾"-1" wire line.

SAFER THAN SORRY — BETTER BE GUIBERSON

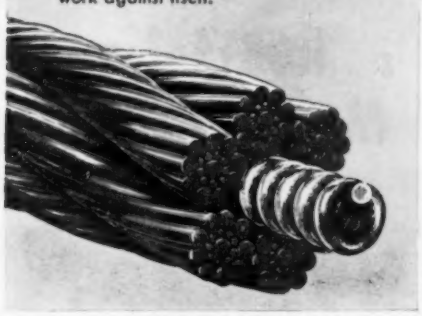
THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by Oil Field Supply Stores Everywhere



Strands are passed through preforming heads where they are shaped to fit the position they assume in the finished rope. Then they are laid around the spring center. This operation provides the driller with a highly flexible line that will not "work against itself."



SPRINGKORE

the wire rope designed for ROTARY DRILLING

SpringKore wire rope is specially designed to stand up under the line stresses of heavy-duty rotary rig drilling. The steel spring center enables SpringKore to "snap back" after the crushing action at the drum and to resist the severe wear at the crown and block sheave. Field tests prove that SpringKore retains flexibility and resistance to crushing longer than any other drilling line now in use.

The hollow inside center of the spring acts as a lubricant reservoir that provides complete lubrication of the rope's innermost parts for the entire service life. Its coiled spring shape gives the outer steel strands of the wire rope firm supporting points which reduce internal pressures and friction.

SpringKore rotary lines are immediately available in standard sizes. See your regular J&L supplier or send the coupon for complete information.

J&L STEEL

Jones & Laughlin

... a great name in steel

Jones & Laughlin Steel Corporation
Wire Rope Division
Muncy, Pennsylvania

☐ Please send information on SpringKore.
☐ Have representative call.

Name_____

Title_____

Company_____

City_____ Zone____ State_____

To keep supports sturdy where maintenance is most difficult, Monel sheathing was applied to this tender type drilling platform during construction by Brown & Root, Inc., Houston, Texas. It is typical of many such structures built by this company.

In tidal zone...hardest to shield... Monel sheathing gives lasting protection against corrosion

Fast becoming standard on offshore structures

THIS drilling platform shows a practice now rapidly becoming universal among large oil companies.

Monel* nickel-copper alloy sheet tightly wrapped about supporting members to protect them from corrosion in the "tidal and splash zone."

Adoption of the nickel-copper alloy sheathing is based upon its actual, on-the-job performance. And in comparison with that of other materials . . . in the hard-to-shield splash zone where water, air and spray attacks fluctuate, leaving piling sometimes wet, sometimes dry.

Monel nickel-copper alloy resists corrosion by salt water, salt air and salt spray. It withstands wave battering and erosive action as well as abuse from floating debris. And it is easily applied by welding.

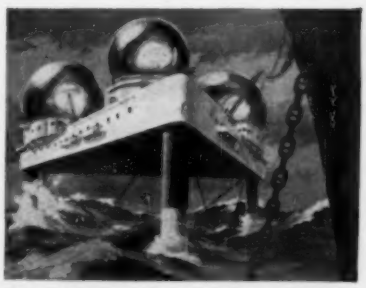
Usually, 8 to 12 feet of each vertical support is completely sheathed with 18-gauge Monel alloy sheet. With tops, bottoms and seams welded, it protects supports in the critical zone . . . mean tide level to a few feet above prevailing wave crests. Protects diagonal braces and conductor pipe sleeves where necessary, too.

With Monel alloy sheathing, many oil companies extend life of drilling and tank battery barges, well head protector platforms and loading docks.

This nickel-copper alloy sheathing may help prolong life of *your* new structures or those now in water. If you need help with your problem, write to International Nickel.

*Registered Trademark

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.



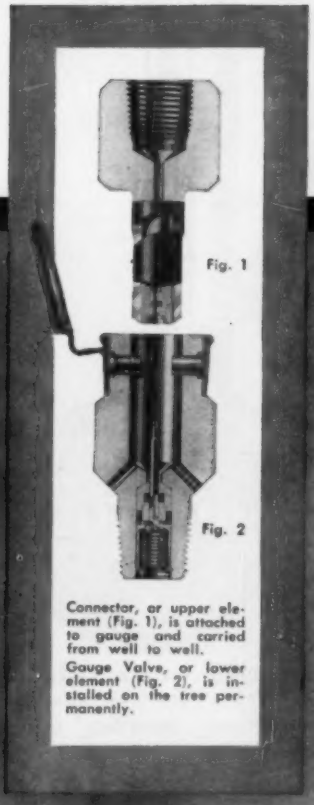
100 miles out in the Atlantic, Monel keeps "sea legs" sturdy under the Navy's man-made islands.

INCO TRADE MARK **Nickel Alloys**

Monel... *for minimum maintenance*

No exposure to elements
No danger of breakage, intentional or otherwise
Save the money you are now spending for gauge repairs
No investment in permanently installed gauges

How to make ONE Christmas tree gauge do the work of MANY



Connector, or upper element (Fig. 1), is attached to gauge and carried from well to well.

Gauge Valve, or lower element (Fig. 2), is installed on the tree permanently.

U. S. Patent No. 2,618,978

GAUGE VALVE AND CONNECTOR, THE MODERN, ECONOMICAL WAY TO OBTAIN ACCURATE WELL PRESSURES

Instead of one, two, or more pressure gauges to the tree, now all you need is one gauge per gauger. Where you would ordinarily install a gauge and valve, simply install a Thornhill-Craver Gauge Valve (Fig. 2). To obtain a pressure reading, just insert a calibrated gauge with Connector (Fig. 1) in the Gauge Valve. Half a turn engages a J-Tool and opens the valve, exposing the gauge to well pressure. Remove the gauge and the valve closes automatically. Since a single gauge is used for any number of wells, that gauge may be checked and calibrated frequently to insure accurate pressure readings for all wells. No gauge inventory. No breakage. No replacements. No repairs. Safe and easy to use. Stainless steel throughout.

THORNHILL CRAVER CO.
P. O. BOX 1184 HOUSTON, TEXAS

UNIBOLT

KONTOL

...a proved gasoline plant corrosion preventive

In the gasoline plant, as well as in the refinery, Kontol corrosion inhibitors are preventing thousands of dollars worth of corrosion destruction. Kontol is not an experimental corrosion inhibitor, but has been used successfully in gasoline plants all over the country. In absorption systems less make-up oil is required since Kontol completely rids the system of corrosive products which discolor and contaminate the absorption oil. In addition to its corrosion inhibiting properties, Kontol's anti-fouling and its detergent characteristics serve to keep condensers and heat exchangers free from fouling. In many cases, the savings in cleaning costs even exceed the savings derived from corrosion prevention.

IN THE GASOLINE PLANT
KONTOL
PREVENTS CORROSION IN

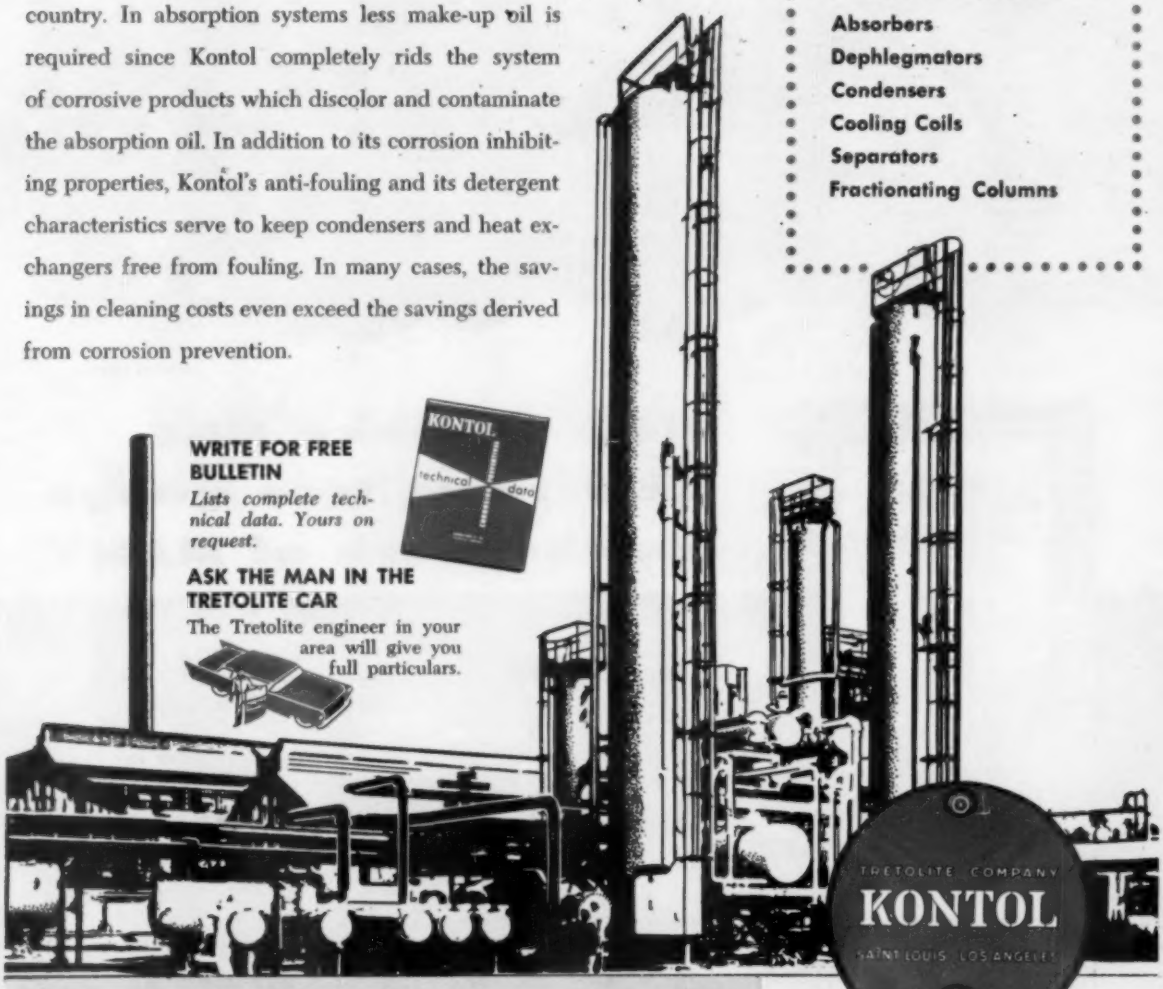
- Absorbers
- Dephlegmators
- Condensers
- Cooling Coils
- Separators
- Fractionating Columns

WRITE FOR FREE BULLETIN

Lists complete technical data. Yours on request.

ASK THE MAN IN THE TRETOLITE CAR

The Tretolite engineer in your area will give you full particulars.



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A DIVISION OF PETROLITE CORPORATION

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By Max Ready—Dale Ledbetter
Johnston Testers

FOR MORE INFORMATION ON YOUR DRILL STEM TEST

A check-off list for reverse circulating drill stem tests

PART II

REVERSE CIRCULATION ON GULF COAST (CASING TEST)

Deep tests and high pressures found in the Gulf Coast (Louisiana and Texas) call for more precise reverse circulating procedures on casing tests. Surface pressures above 7500 psi have been encountered and wells below 15,000 ft. have been successfully tested and the recovered fluid reversed out.

While cased holes supply ideal reversing conditions by covering possible sloughing formations and allowing application of pressure in the annulus to speed the reversing process, the high formation pressures must be carefully guarded to prevent blow-outs. Both flow and reversing from these high pressure formations are controlled by 10,000 to 15,000 psi test flow heads.

The Type A Reversing Sub, Type B Reversing Sub and Shut-In Reversing Valves may be used equally well on casing tests. The shut-in reversing valve can be operated to take formation shut-in pressure and provide ports for reversing. These operations can be done separately or simultaneously—at the discretion of the oil company representative.

The practice of reversing from "bottom" and the "simultaneous" operation of the SIR valve is widely used.

Reversing sub or valve locations are dependent on the amount of "sample" to be left in the pipe. The "sample" attains even greater importance in cased holes because a small amount of salt water may indicate a cement "channel" job, which, if unnoticed, might lead to a work-over at a later date.

The SIR Valve can be operated without bleeding down the tubing or drill pipe pressure—an added feature which helps prevent tubing or drill pipe collapse.

If packer remains seated during reversing, pressure applied to the casing annulus will be blocked from the perforations tested.

The speed of reversing can be controlled by regulating the valves on the surface flow manifold and the pressure applied to the mud in the annulus below the closed rams or "Hydril."

By closely checking the weight (pounds per gallon or pounds per cubic foot) of the fluid being reversed out, a minimum of expensive drilling mud will be wasted. Normally reversing will be complete when clean mud of normal pit weight appears at the surface.

Reverse circulation check off list

Before operating reversing valve
- ☐ Pump running
- ☐ Mud line valves positioned to divert mud flow to annulus
- ☐ Rams and/or Hydril checked for operation

Operating Reversing Valve (Type A and/or Type B)
- ☐ Close well in at surface
- ☐ Disconnect high pressure steel flow hose
- ☐ Close shut-in tool by rotating
- ☐ Reconnect high pressure steel flow hose
- ☐ Bleed down drill pipe (if go-devil hanger not used)
- ☐ Check mud in annulus (*must stay full* throughout reversing operation). Packer may be pulled loose if shut-in period is completed.
- ☐ Drop proper go-devil to operate reversing sub
- ☐ Close surface valve (keep closed as long as annulus is *not* full)
- ☐ Control flow of recovery with surface valves so that hole remains full of mud.

Operating Shut-In Reversing Valve
- ☐ Close well in at surface
- ☐ Disconnect high pressure steel flow hose
- ☐ Check mud in annulus (must stay full during shut-in and reversing procedure)
- ☐ Rotate to close SIR Valve for shut-in (if valve is "blanked-off" reversing may be started by further rotation, 11 rounds only —if valve is not "blanked-off," do not rotate into reversing position)
- ☐ Rotate SIR Valve into reversing position (total of 11 rounds)
- ☐ Reconnect steel flow hose
- ☐ Keep surface valve closed as long as annulus is not full of mud
- ☐ Control flow of recovery with surface valves so that hole remains full of mud

NOTE: If reversing stops, apply moderate pressure to annulus or apply moderate pressure to tubing or drill pipe until normal circulation is barely established then go back to reverse circulation.

When natural reversing is completed or to speed reversing procedure
- ☐ Close rams or Hydril
- ☐ Apply moderate pump pressure to annulus
- ☐ Stop pumps when clean mud of normal weight is reversed
- ☐ Remove flow head and come out of hole at proper speed (prevent swabbing). Pipe should pull dry.

This is the second article on Reverse Circulating drill stem tests. The first article covered reverse circulation in the Permian Basin.

For complete information on Reverse Circulation write Johnston Testers, Houston, Texas.

DALE LEDBETTER
Dist. Mgr.
Houston, Texas

MAX READY
Area Mgr.
Louisiana Gulf Coast

Type B Reverse Circulating Sub

Type A Reverse Circulating Sub

Shut-in Reversing Valve

JOHNSTON TESTERS

A Subsidiary of Schlumberger Well Surveying Corporation

first in drill stem testing

HOUSTON, TEXAS

LONG BEACH, CALIFORNIA • CALGARY, CANADA

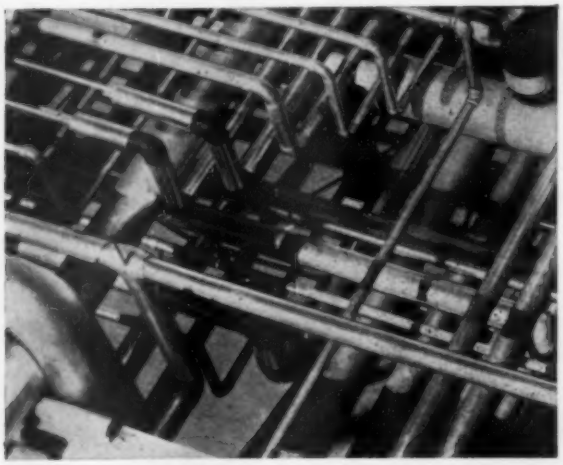
FORMATION AND CASING TESTING — JOHNSTON

ALUMINUM the no-maintenance metal . . . serves you better when you use Reynolds technical services and information

ALUMINUM is the natural choice for process industry applications. It has high resistance to corrosion — is unaffected by most plant atmospheres. Aluminum does not require protective maintenance to insure its long, useful life.

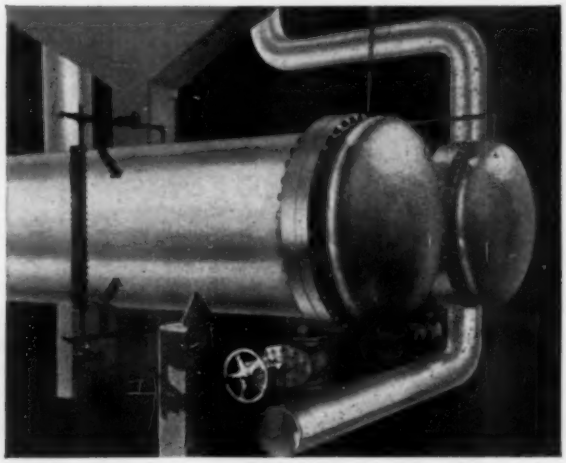
Aluminum makes construction faster and easier, thanks to its light weight and ease of fabrication. And it is non-sparking, amazingly strong, reflects heat.

For full information on how much Reynolds Aluminum can save for you, and how you can get Reynolds technical assistance, call the Reynolds office listed under "Aluminum" in your classified telephone directory. Or write direct *Reynolds Metals Company, P. O. Box 1800-CR, Louisville 1, Kentucky.*
International Division, 19 East 47th Street, New York 17, N. Y.



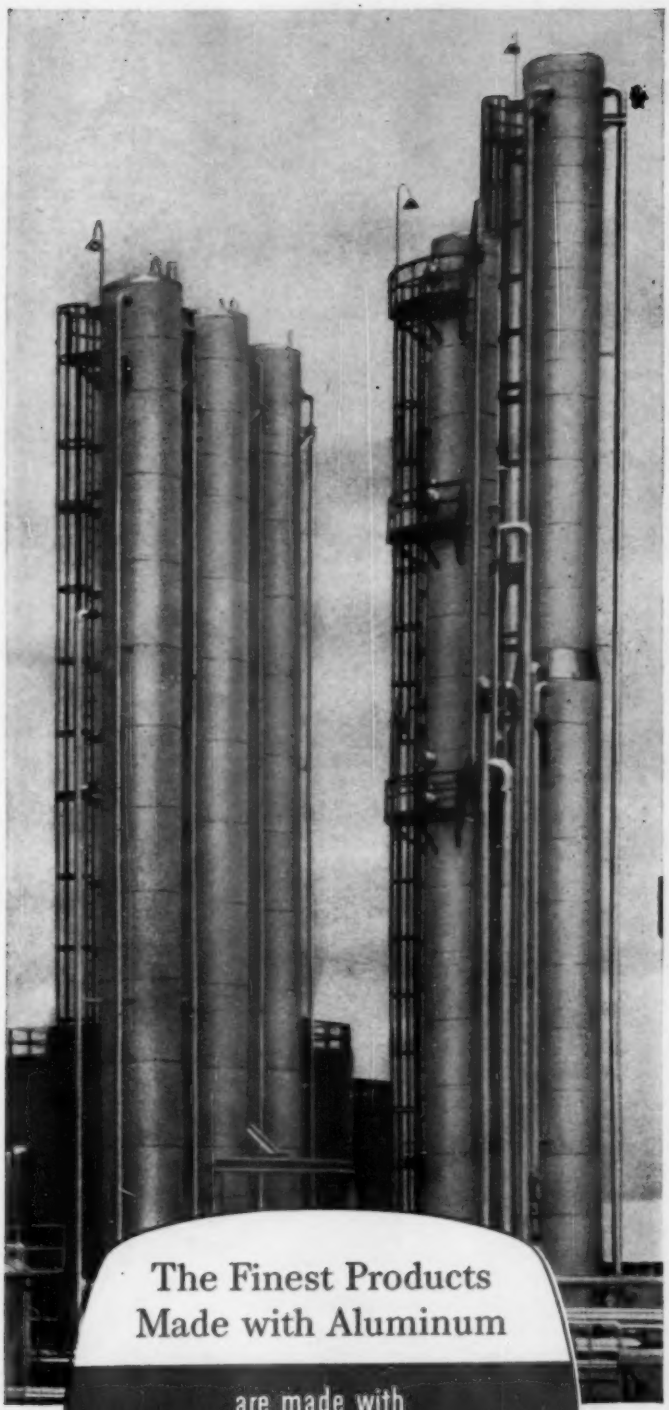
ALUMINUM PROCESS PIPE

Many chemical and petroleum processors call it the most economical corrosion resistant pipe available. Resists corrosive action of many process liquids and gases such as hydrogen peroxide, nitrogen solutions, many acids, alcohols and foods as well as sweet and sour crudes, other raw and refined petroleum products. Aluminum pipe is light, easily weldable, non-sparking. Write for Reynolds complete brochure on Process Pipe.



ALUMINUM HEAT EXCHANGER TUBING

Offers lower cost as its first advantage. Has less tendency to foul than other metals, providing longer periods between cleanouts and more lasting efficiency. Light weight reduces fabrication, installation and shipping costs. Aluminum is exceptionally well-suited to bundle and shell type exchangers. Recommended for use up to 400° F. Send for 16 page brochure, Reynolds Aluminum for Heat Exchangers.



The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

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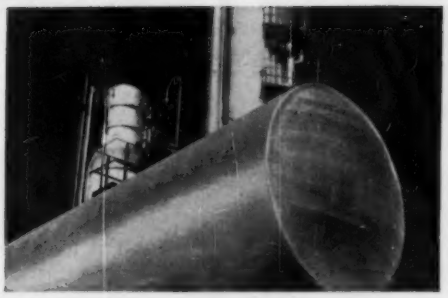
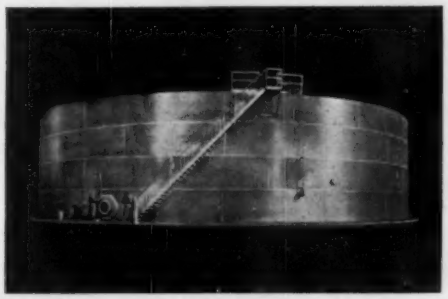


ALUMINUM JACKETING

Gives plants new and lasting functional beauty. Eliminates costly periodic maintenance. Adds the product-protecting advantage of aluminum's natural insulating qualities. Now the standard jacketing material in many major plants.



ALUMINUM TANKS AND VESSELS

All-aluminum construction of tanks and vessels assures long life and great freedom from maintenance. Inert in the presence of most process materials, aluminum protects product purity. In these and many other process industry applications aluminum structurals, sheet and plate offer savings in construction and service. Write for Reynolds new brochure on Aluminum Tanks and Vessels.

ALUMINUM CHAIN LINK FENCING

Fenced areas require no preventive maintenance with aluminum chain link fencing. Resists corrosion even in the most active industrial atmospheres. Write for illustrated four color brochure containing specifications.

Watch Reynolds All-Family Television Program "DISNEYLAND", ABC-TV.

REYNOLDS ALUMINUM

HAZARD LAY-SET VHS 15% stronger

Lay-Set VHS Wire Lines plus long lengths and proper cut-off practices...

Your answer to longer line life than ever before!

Have you begun a program of drilling line control similar to that adopted by many other operators which results in longer line life at no sacrifice in line safety? If not, you owe it to yourself to find out how this 3-point program can help you cut costs by getting never-before-equalled Ton-Mile advantages out of drilling lines.

Point 1—Use LAY-SET VHS lines exclusively because they are made of new tougher, wear-resistant high tensile rope wire—15% stronger than Improved Plow Steel. LAY-SET VHS has a greater resistance to abrasion and peening...vital in maintaining line shape and diameter. And LAY-SET VHS has the highest safety factor of any line available today, an advantage of increasing importance the deeper your drill stem goes.

Point 2—Buy LAY-SET VHS wire rope in sufficient length to allow for ample line reserve. Thus, you can make a maximum number of cuts in the line available before it must be completely discarded.

Point 3—Arrive at a predetermined cut-off schedule and stick to it! This way, you get greater serviceability from lines based upon the specific requirements of your rig.

Let our field man help you in selecting the right cut-off practice for your lines. When you call him, he'll leave a Ton-Mile Record Book containing reference tables and forms to assist you in carrying out his recommendations.

HAZARD WIRE ROPE DIVISION

American Chain & Cable Company, Inc.

Sales Offices in: Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

PLANTS IN WILKES-BARRE, PA., AND HOUSTON, TEXAS

DOCTOR OF SHIPS

Rick Bruhn specializes in preventive "medicine."

Rick is the Mobil marine engineer in Hong Kong. His counterparts work in every major Free World port—more than 400.

As you trust the skill, training and experience of your doctor, so do the men who know marine machinery trust the Rick Bruhns to diagnose their ships' needs and prescribe the right fuels and lubricants.

Mobil know-how created the first and most comprehensive service of this kind. It helps make sure that goods you send or receive move without delay—that as a passenger you arrive and depart on schedule—that every voyage is a Bon Voyage.

This is the master's touch in oil—servicing the world's mightiest warship, the world's fastest boat, every flagship of every leading ship line, two-fifths of all the world's freighters as well as the first atomic-powered submarine.

SOCONY MOBIL OIL COMPANY, INC.

and Affiliates: Magnolia Petroleum Co., General Petroleum Corp.

Leader in lubrication for 91 years

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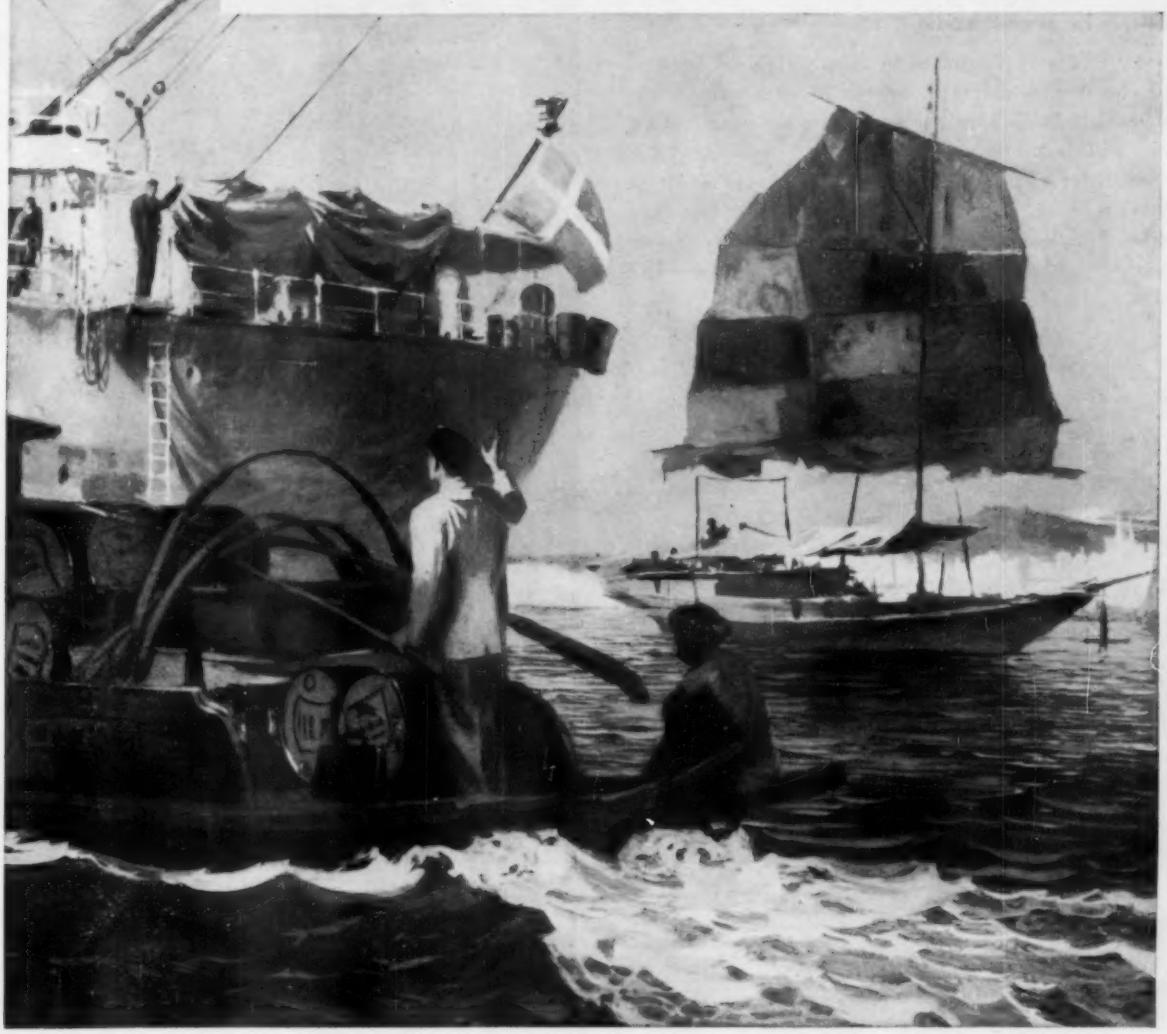


When You Use Armco Casing

the job goes fast • costs stay low

Casing jobs go fast with Armco Slip-Joint Casing. Just stab the end of the next joint into the collar, make a quick weld, and the string is ready to lower. Armco Casing comes in long, 40-foot lengths. This means fewer joints in the string —less running time. Line-up and stabbing go quickly and easily with the uniformly round diameter and square cut ends of Armco Casing.

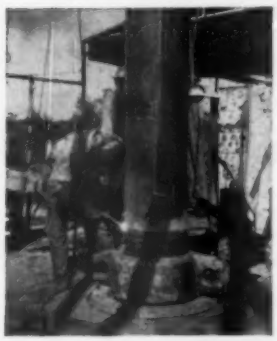
Wide size range saves money

Armco Casing is supplied in a wide range of diameters (6 to 36 inches) and wall thicknesses ($\frac{3}{16}$ to $\frac{1}{2}$ inch). By ordering *exactly* what you need, you get maximum footage per ton of steel.

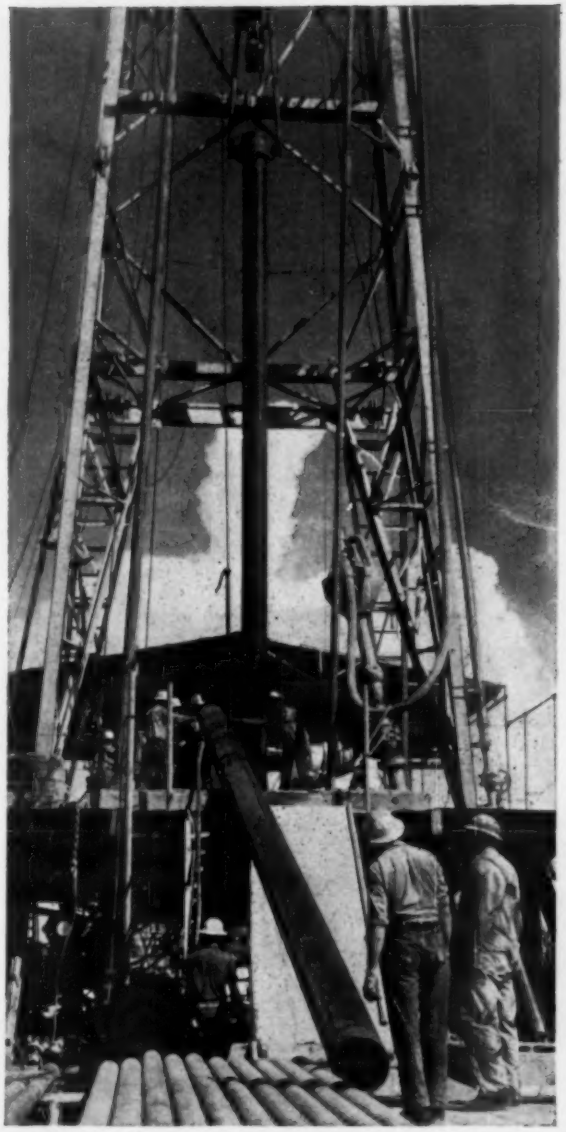
Quickly Available

Armco Casing is distributed by National Tank Company from 28 stocking points throughout the oil country. When you have a "rush" job, a phone call to the nearest stock point will start the casing on the way.

Write for complete data. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 4517 Curtis Street, Middletown, Ohio • 201 KOME Building, Tulsa, Oklahoma • Subsidiary of Armco Steel Corporation • Export: The Armco International Corporation.



The Armco Slip-Joint Collar holds the next joint in alignment while welder makes a fast downhand fillet weld.



ARMCO SLIP-JOINT CASING

Distributed by National Tank Company, Tulsa, Oklahoma. In Canada: National Tank Company, Ltd., Edmonton, Alberta

National Tank Company Stocking Points for Armco Casing: Edmonton, Canada; Swift Current, Canada; Williston, North Dakota; Casper, Wyoming; Kimball, Nebraska; Sidney, Nebraska; Brush, Colorado; Great Bend, Kansas; Liberal, Kansas; Pawhuska, Oklahoma; Oklahoma City, Oklahoma; Seminole, Oklahoma; Farmington, New Mexico; Hobbs, New Mexico; Pampa, Texas; Lubbock, Texas; Snyder, Texas; Abilene, Texas; Electra, Texas; Odessa, Texas; Corpus Christi, Texas; Houston, Texas; Shreveport, Louisiana; Lake Charles, Louisiana; New Iberia, Louisiana; Harvey, Louisiana; Clay City, Illinois; New Harmony, Indiana.

ARMCO®

BE SAFE FROM FIRE...

with Kidde extinguishing equipment

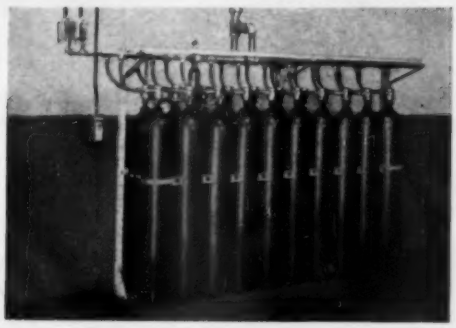
PORTABLE EXTINGUISHERS

Trigger Carbon Dioxide | Squeeze-Valve Carbon Dioxide | Foam Soda-Acid Clear Water Anti-Freeze | Pressurized Water Anti-Freeze | Pressurized Dry Chemical | Cartridge-Operated Dry Chemical | Pump Tank Water Anti-Freeze | VL Pressurized | VL Pump

Kidde hand portables are designed to knock fires out *fast*, come in a variety of types and models. Kidde offers a complete line, a type and size for every need. The Kidde line includes carbon dioxide extinguishers with fast-acting trigger release or squeeze-valve release in capacities of 2½ to 20 pounds. Kidde dry chemical extinguishers can be had in pressurized models of 5, 10, 20 and 30 pounds capacity, and in cartridge-operated models of 20 and 30 pounds.

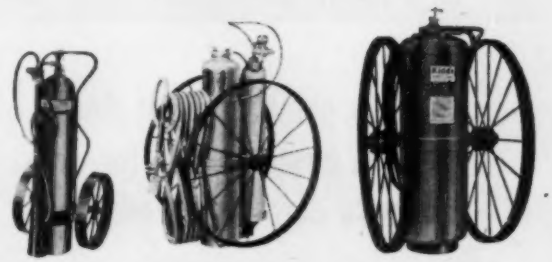
New Kidde wet chemical extinguishers (foam, soda-acid) are available in 2½ gallon bronze or stainless steel models, including cartridge-operated and pressurized water or water-anti-freeze units. Kidde vaporizing liquid extinguishers, come in pump capacities of 1 and 1½ quarts, pressurized in 1 and 1½ quarts and 1 gallon. Kidde pump tank extinguishers, in steel or copper shells, are available in 2½ and 5-gallon sizes.

CUSTOM-ENGINEERED CARBON DIOXIDE SYSTEMS



New Kidde pressure-operated carbon dioxide extinguishing systems are individually designed to fully protect even the most dangerous hazards, use no falling weights or clumsy mechanical triggering methods. Pneumatic Control Heads insure instant and complete carbon dioxide discharge. Directional valves afford protection to more than one hazard using the same bank of carbon dioxide cylinders. All operating parts are self-enclosed for safety. Visual indicators show at a glance if system is "set" or "released." Thermostatically operated systems, and package systems for flammable liquid hazards up to 6000 cubic feet are also available.

MOBILE EQUIPMENT



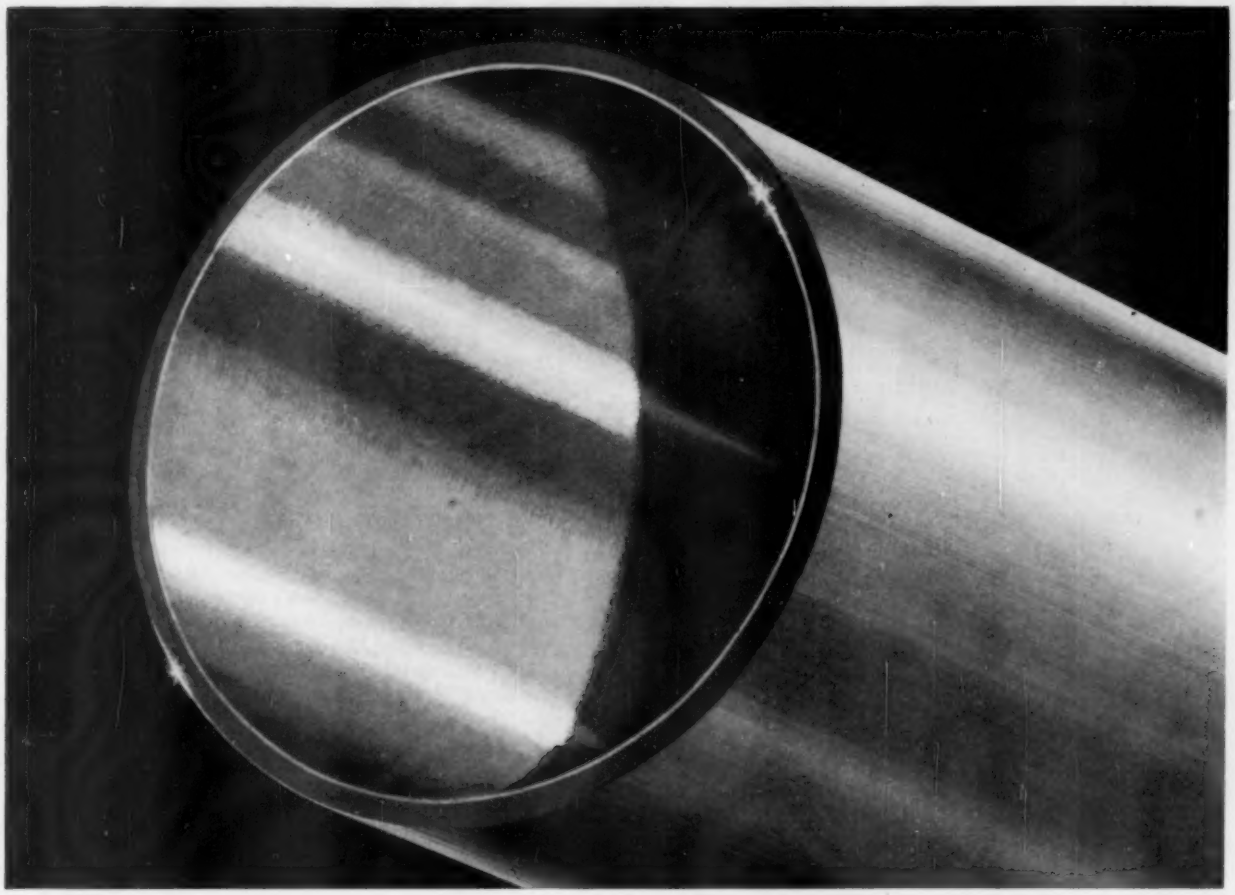
50, 75 and 100-Lb. Carbon Dioxide | 150-Pound Dry Chemical | 40-Gallon Foam, Soda-Acid

For major fire hazards, get a mobile unit. Wheeled carbon dioxide units are available in 50, 75, and 100-pound capacities, in one cylinder. Shut-off valve located at nozzle gives operator complete control. 150-pound dry chemical unit has straight stream for long range . . . fan pattern for wide coverage. Single-lever control for "on", "off", "fan", or "straight" discharge pattern. 50 feet of hose. 40-gallon wheeled foam unit delivers more than ten times its liquid content capacity in fire-smothering foam. Ideal protection against flammable liquid fires. 50 feet of hose. All units give expert results even with inexperienced operator.

Kidde (K Kidde)

Walter Kidde & Company, Inc., 1054 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd., Montreal—Toronto



New plastic coated pipe is custom made for severe corrosion conditions

NOW—with Tube-Kote's tough, new TK-33 baked Polyurethane coating—Kaiser Aluminum offers you aluminum pipe with almost unlimited applications for oil field use.

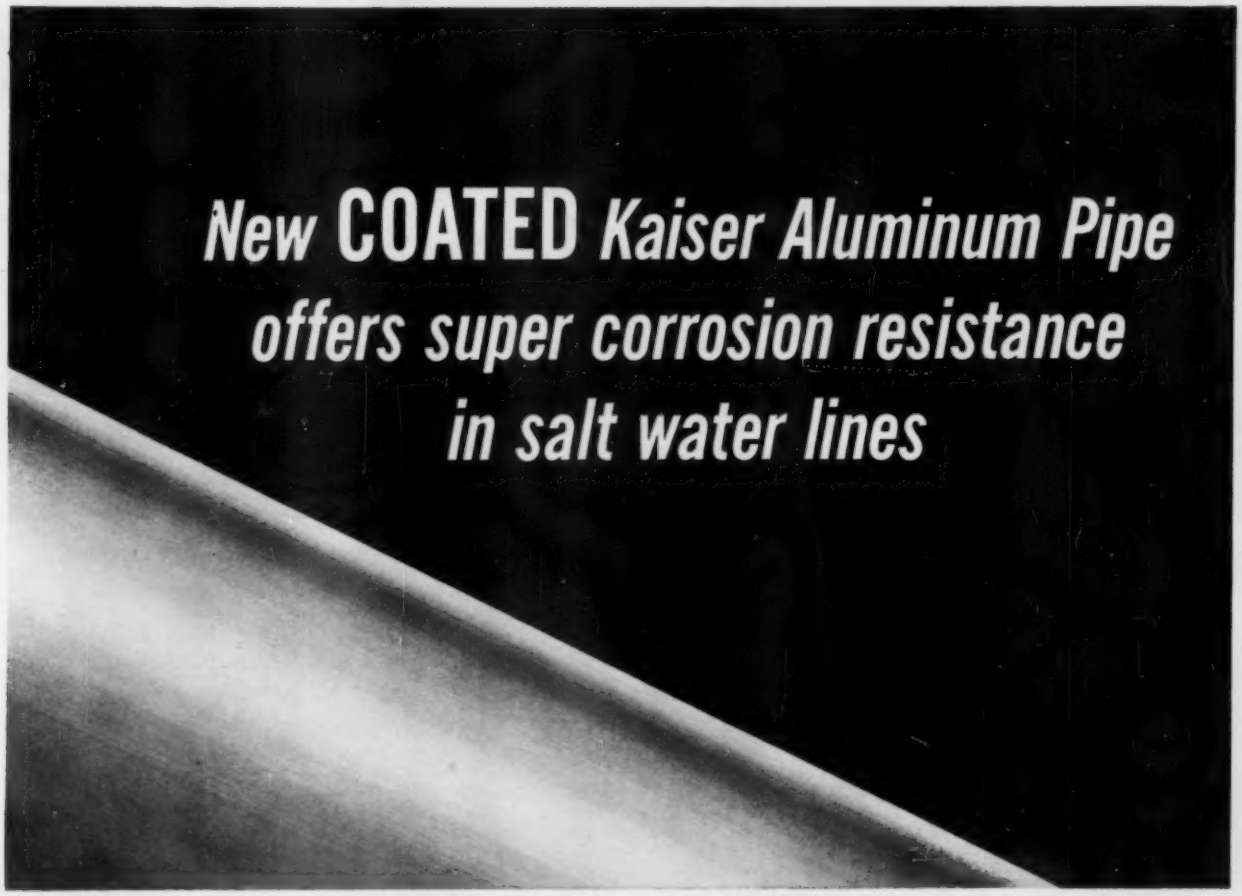
Strong, durable Kaiser Aluminum pipe coated internally with flexible TK-33 is designed to resist the most severe corrosion. It has all the advantages of lightweight, easy handling aluminum in a pipe that permits the lowest possible installation cost for above ground piping systems. It's designed for salt water injection and disposal lines, sour crude oil flow lines, and many other applications where extreme internal corrosion can be a problem.

Look at the tested advantages of TK-33 Polyurethane coating.

- Excellent resistance to salt water, acid, caustic fluids, crude oil and other highly corrosive agents.
- Won't crack, craze or chip—high degree of flexibility allows TK-33 to move with the metal.
- High impact resistance . . . TK-33 passes 20% elongation at 14.8 ft./lbs. impact in G-E Impact-Flexibility Tester.
- Excellent abrasion resistance—tough coating stands up under the wear of friction.

KAISER Aluminum

THE BRIGHT STAR OF METALS



TUBE-KOTE OF HOUSTON
NEW KAISER ALUMINUM DISTRIBUTOR

TUBE-KOTE, developer of TK-33 Polyurethane coating, joins Oil Well Supply, Republic Supply Company and Dunigan Tool & Supply Company as a new distributor for high quality Kaiser Aluminum petroleum pipe.

New TK-33 coated Kaiser Aluminum pipe, coated by Tube-Kote, is available through our distributors in a complete range of sizes in schedules 5, 10 and 40. Also available—fast delivery of standard corrosion resistant Kaiser Aluminum pipe in 20, 30 and 40-foot lengths in 2″ diameter, 0.065″ wall thickness; 2½″, 3″ and 4″ diameter, 0.083″ wall thickness. Other sizes subject to special inquiry.

For information contact any distributor shown below—or your local Kaiser Aluminum sales office. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, Calif.

distributed by

Tube-Kote
2727 Holmes Road
P. O. Box 20037
Houston, Texas

Oil Well Supply
Division United States
Steel Corporation
Dallas, Texas
(Home Office)

Republic Supply Company
Republic Building
Oklahoma City

Dunigan Tool & Supply Company
1534 South Treadway
(Home Office)
Abilene, Texas

"Spiro-Wipers made with neoprene give us top wiping action and longer service"

says L. R. Mondotte, Tool Pusher, Fred Johnson Drilling Co.

"Keeping the rig floor free of mud when coming out of the hole is an important safety factor," continues Mr. Mondotte. "And long service life is the key to lower operating costs. The neoprene Spiro-Wiper does both for us."

The inner neoprene triple wiping lips of the wiper have that extra snap-back action and they keep their "snap" longer than wipers made of other rubbers. It gives full wiping efficiency when pulling tool joints, collars and large diameter tools, assuring easier racking of the string.

The tough neoprene outer periphery of the Spiro-Wiper provides the necessary rigidity without any steel reinforcement.

Neoprene is economical. The same wiper can be used with both oil and clay base muds. Resistance to chemicals and excellent storage life guarantee performance.

You, too, can get long, economical and trouble-free service life from your rubber products – just specify neoprene, Du Pont's synthetic rubber, the next time you order. E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept., Wilmington 98, Delaware.

NEOPRENE lips of the Spiro-Wiper are being discussed by Tool Pusher L. R. Mondotte of the Fred Johnson Drilling Co., and salesman John Ruyle, of Grant Oil Tool Co. Cross section of wiper shows how its continuous three-turn spiral design gives triple wiping action.

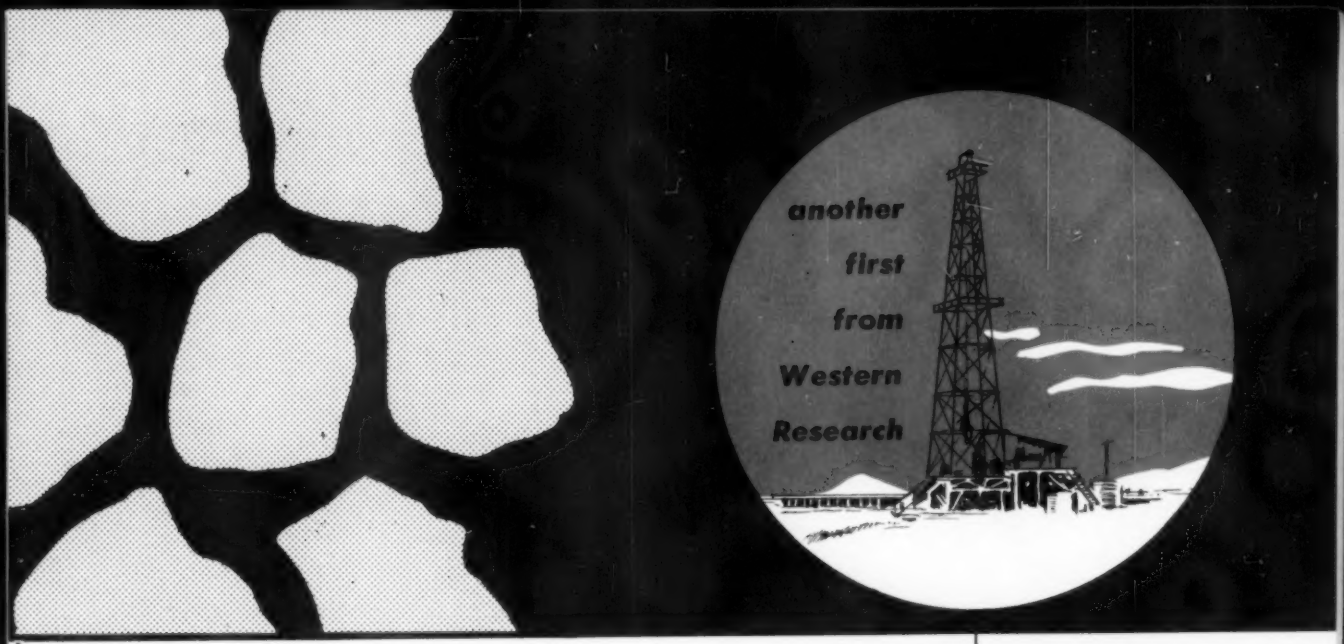
NEOPRENE

MADE BY DU PONT FOR 25 YEARS

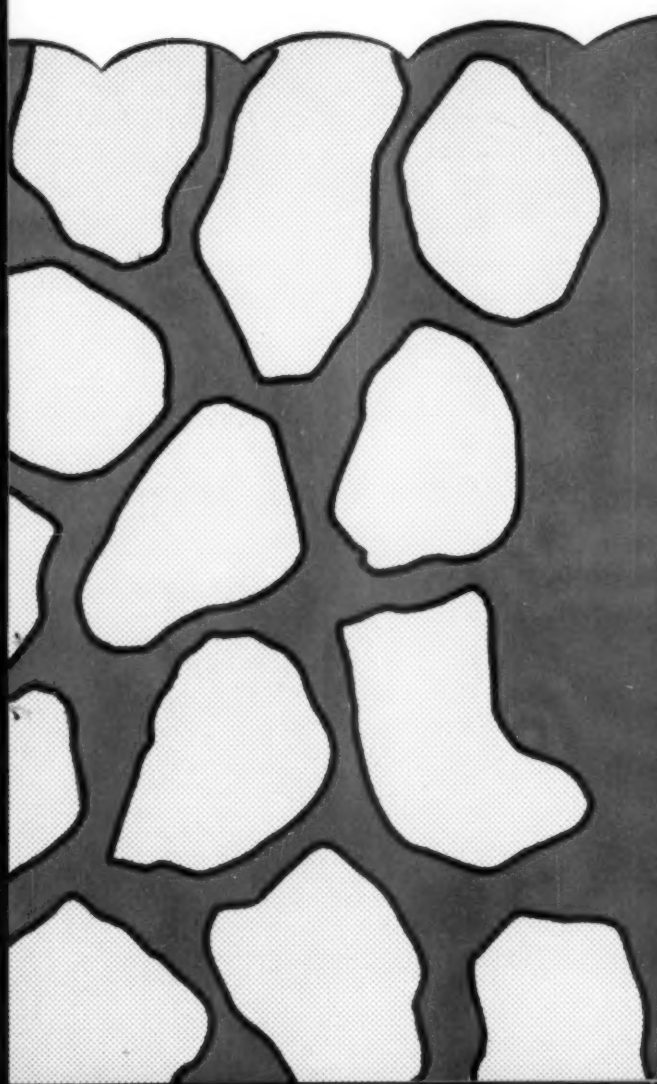
DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . through chemistry



SEAL OFF WATER



If your well - - -

- ✓ has productive water stringers
- ✓ has a water cone
- ✓ has water fingering to the well bore
- ✓ was fractured or acidized into water
- ✓ has communication with water table

SEE NEXT PAGE

Western Engineering makes the difference

WESTERN'S SELECTIVE WATER-SEAL SERVICE

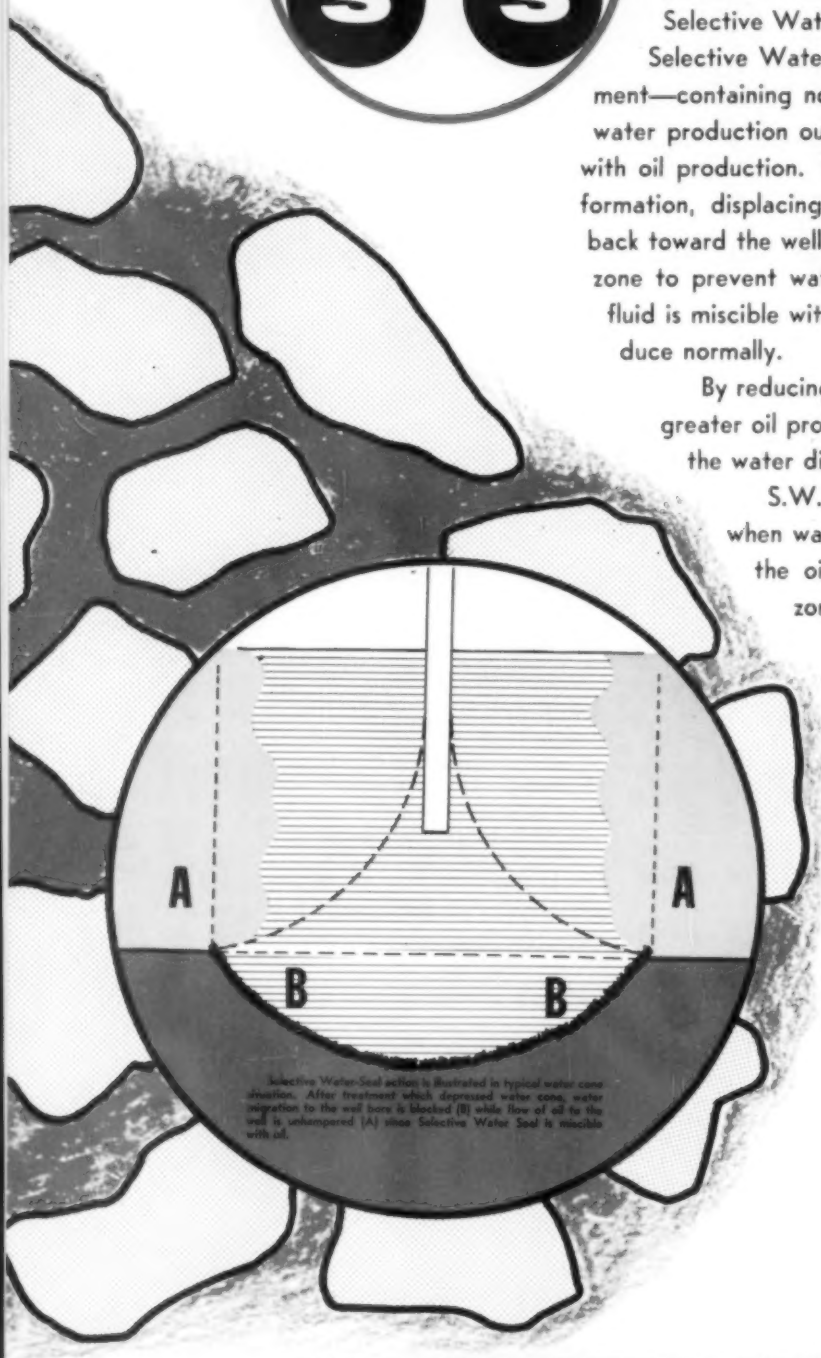
For the first time, an effective method of selectively reducing or completely shutting off water production in oil wells is now available — Western's Selective Water-Seal Service.

Selective Water-Seal Service is a new chemical treatment—containing no solids—designed to selectively block water production outside the well bore without interfering with oil production. The treating fluid is pumped into the formation, displacing the water. When the water moves back toward the well bore, a barrier is formed in the water zone to prevent water entry. Since Selective Water-Seal fluid is miscible with oil, it therefore allows the oil to produce normally.

By reducing or shutting off water, S.W.S. permits greater oil production, cuts lifting costs, and reduces the water disposal problem at the surface.

S.W.S. Service is completely selective—when water is being produced separately from the oil in the same zone, or from another zone.

Selective Water-Seal is proved in wells throughout the Southwest. Call your Western Engineer today for more details on Selective Water-Seal, the revolutionary new engineering advance by Western. Or write for information to The Western Company, Box 310, Midland, Texas.



Selective Water-Seal action is illustrated in typical water cone situation. After treatment which depressed water cone, water migration to the well bore is blocked (B) while flow of oil to the well is unhampered (A) since Selective Water Seal is miscible with oil.

WESTERN ENGINEERING MAKES THE DIFFERENCE

WESTERN Engineered WELL SERVICES

THE WESTERN COMPANY

general offices: MIDLAND, TEXAS

TEXAS: Odessa, Seagraves, Snyder, Lubbock, Borger, Rankin, Andrews / OKLAHOMA: Lindsay, Healdton, Okla. City / NEW MEXICO: Hobbs KANSAS: Ulysses, Liberal

engineered corrosion control with *Cronox*® inhibitors

The pay-off of corrosion control . . . in preventing loss of production and prolonging equipment life . . . depends on how thoroughly the job is engineered.

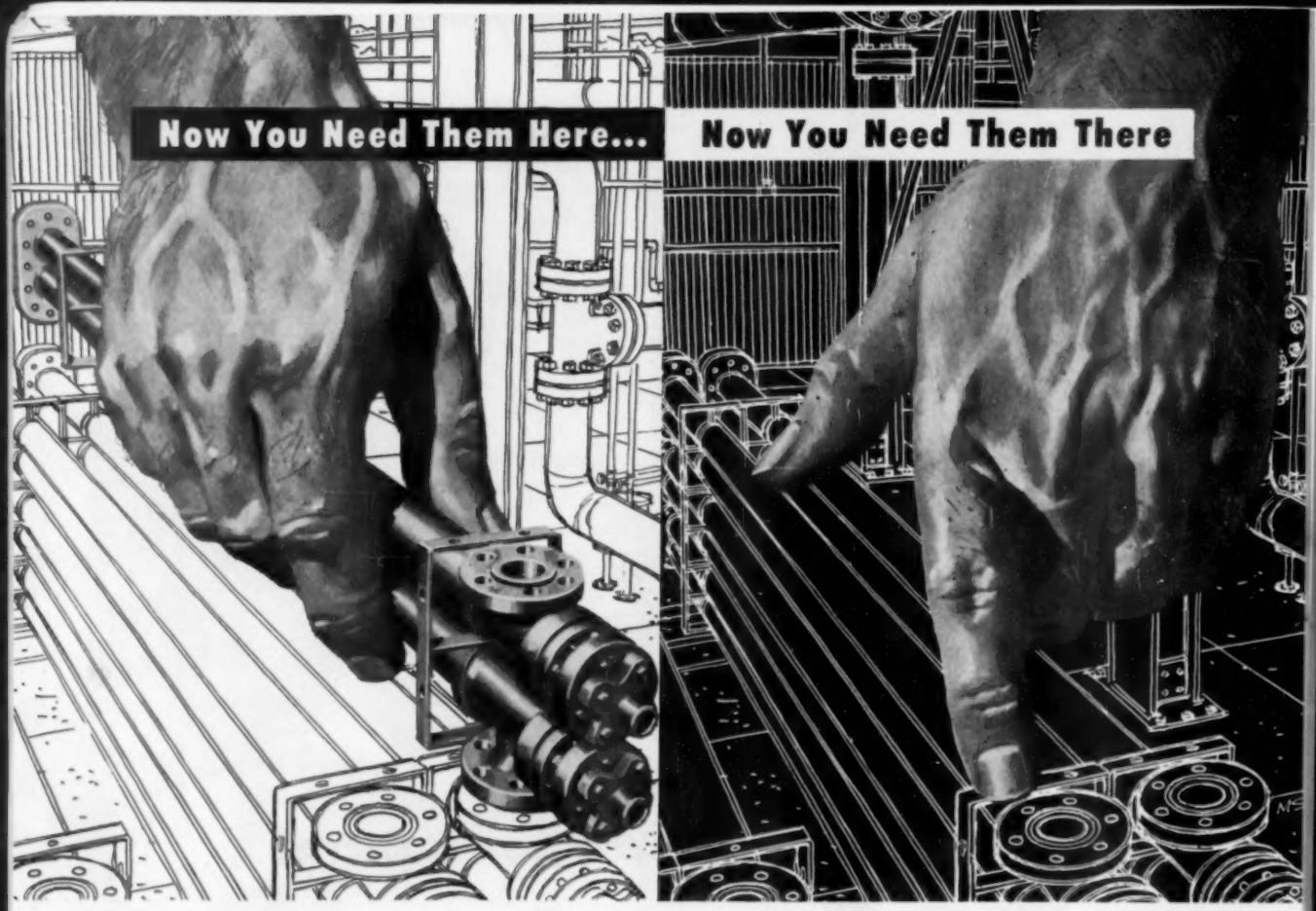
And thorough engineering is what you are sure of getting from Aquaness. First, because your Aquaness representative's experience has been gained where it counts . . . in the field. He is familiar with the corrosion problems of all types of wells . . . flowing, gas-lift, gas-condensate, pumping or water flood.

Second, because there is a Cronox inhibitor for every application . . . vapor phase, sticks and concentrated . . . bactericides and bactericide-inhibitors. From these your Aquaness representative can make exact recommendations for your wells.

Get your engineered corrosion control program started today, by calling your local Aquaness representative.

New booklet! "CRONOX Corrosion Inhibitors."
Write for your free copy.

Aquaness Department
ATLAS
ATLAS POWDER COMPANY
2005 Quitman Street, Houston 26, Texas



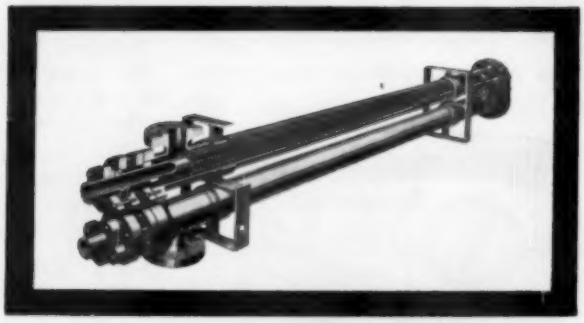
You Can Move ALCOTWIN Heat Exchangers as Loads and Processes Change

The flexibility of ALCOTWIN® heat exchangers means that you can change load or processes within your plant and still use the same heat-exchange equipment. You can easily add new ones for increased load, or you can rearrange present ones for changing conditions. They never become obsolete because of their unlimited number of applications.

ALCOTWINS are in stock in Beaumont, Texas, for immediate delivery when you need them. They are available off the shelf in a number of sizes, for pressures up to 600 psi and temperatures to 650° F.

You get real economy in first cost, in ease of installation and maintenance. In addition, you can select the precise metallurgy needed for best results in your application. The ALCO gas shielded tungsten arc welding method of fusing the fins to the tube permits the widest possible range of metallurgy.

Complete information is available from any of ALCO's sales offices. For a copy of Bulletin FH-3, write Petroleum Industry Equipment Division, Dept. AW-3, P. O. Box 1065, Schenectady, New York.



ALCO

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

Locomotives · Diesel Engines · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Weldments · Oil-Field Equipment

They Say—

Perils of selling to U.S.

"The greatest disadvantage of doing business with the Government for small refiners, and large ones too for that matter, is the uncertainty of it. The biggest uncertainty of course, arises from the nature of the competitive bidding system.

"A refiner has no opportunity to establish goodwill with a customer, as he would in his normal commercial business. He may have a contract to supply a given base for a year or 2 years and then suddenly lose it to a lower bidder. This makes sellers wary of becoming too heavily committed with government business. The result is that sales to the Government are regarded by too many companies as being simply a 'dumping ground' for surplus stocks. The Government gets the benefit of low prices when surpluses are available, but it finds products short at other times. This also brings about the unusual situation where bidders will offer a quantity in increments, with a higher price charged for the larger quantity, contrary to the normal commercial practice of giving a lower price on larger quantities.

"There does not seem to be any way of removing this uncertainty and, at the same time, preserving for the Government the advantages of vigorous competition.

"On the other hand, the Government can take steps to remove some of the risks and uncertainties which are associated with government business. Number 1 in this respect is the policy of purchasing under 'open-end' contracts which are, in effect, nothing but options under which the supplier must agree to hold in readiness a supply of product for the Government and is legally obligated to supply the entire quantity, while the Government, on its side, is obligated to take only $100 worth of the total. This has always been a problem to the supplier, but it has been particularly aggravated in recent months as a result of the economy cutback program of the Defense Department."

Donald C. O'Hara, associate counsel, National Petroleum Association, during a panel discussion on military petroleum supply problems at the annual meeting of the Quartermaster Association.

Best guess sets price pace

"In general, people who have mistaken price initiative for price control have probably paid too much attention to posted, listed, and otherwise published prices. These prices, though highly useful to oil men for reference purposes, fall far short of indicating the infinite variety, continual change, and pervading competition which characterizes oil prices.

"Price leadership in the oil industry is somewhat like the possession of initiative in an informal group of boys. The leader is not elected, nor does he hold office for any particular term. He lasts as a leader only so long as he keeps guessing right on the trend."

Harold Fleming, former economic and business coordinator with Christian Science Monitor, in an article in the Autumn issue of "Our Sun," magazine of Sun Oil Co.

Harris bill support urged

"Seldom has there been a more controversial piece of legislation before Congress (than the Harris-O'Hara bill). The many pressure groups involved want concessions which favor their particular group . . . It is, of course, im-

DESCO LUBRICANTS

STAY

in your plug valves – make plug valves stay on the job!

Plug valve lubrication is our business — our only business! DESCO Plug Valve Lubricants are synthetics made from chemical compounds specifically developed for each type of service. They are ALL lubricant and contain no inert material. That's why Desco Lubricants STAY in your valves and do not harden or coke-up.

HELPFUL COLOR CODE

The four Standard Lubricants are Color Coded to prevent errors and speed operation. Gun grip, valve tab, carton labels, and the lubricant itself are a matching color to identify the service.

4 STANDARD AND 3 SPECIAL DESCO LUBRICANTS HANDLE ALL SERVICES

The DESCO user has the advantage of never having to stock many lubricants — this not only reduces inventory but it also reduces the possibility of using the wrong lubricant. Most plants require only one or two types.

PACKED IN CONVENIENT STICKS OR BULK

DESCO Lubricants are available in 6 sizes of sticks, including a gun size stick. For volume users DESCO Lubricants are packed in 5-quart, 40-pound and 100-pound drums.

DELTA-DESCO

WRITE FOR CATALOG

The Only Complete Plug Valve Lubrication Company

PLUG VALVE LUBRICANTS AND EQUIPMENT

Color Coded Lubricants • Hand Guns
Fittings • Air-Motor Volume Guns
Automatic Lubricators • Electronics

DELTA-DESCO COMPANIES

DELTA ENGINEERING SALES CO.
Box 1403 Shreveport, Louisiana
Branch Offices in All Principal Cities

Announcing the

Standard kick-over tool used to run new Otis valve

Otis valve lands in standard side-pocket mandrels

Main valve is a resilient, special Hycar element — 1 of only 2 moving parts

Second moving part is check valve of same material, which opens only when valve functions

Type F Otis Retrievable Gas Lift Valve

It's New... It's Different... It's the Valve Gas Lift Men Have Been Wanting to Run for Years!

ONLY 2 MOVING PARTS... NO METAL MOVING PARTS

Imagine a tool with no valve seats to cut out... no metal bellows to fatigue ... and with a dome area sufficient to open the valve on only 10 to 15 pounds' build-up above the set pressure. And once a string of Type F Otis Valves is installed, a well can be lifted either by continuous or intermittent flow, *simply by adjustments at the wellhead. No need to run another string to convert a system — a simple solution to borderline wells* (one-third of the gas lift wells on the Gulf Coast). The new Otis retrievable valve is also

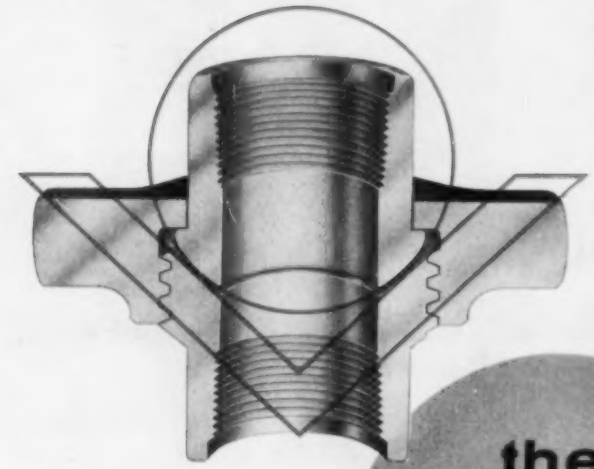
- *Completely surface-controlled . . . operated by the gas injected at the surface*
- *Completely balanced . . . unaffected by tubing pressure*
- *Simple in design . . . only 12 principal parts*
- *Easily repaired and reconditioned . . . at very small cost*

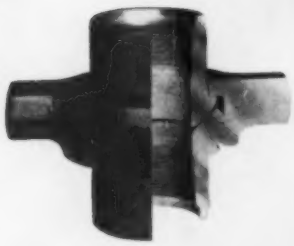
All in all, you'll find this new valve to be the most efficient, flexible gas lift valve on the market... with many operating features not available in any other equipment. Your nearest Otis office will be glad to give you additional details, illustrated literature, and advise you on using these versatile new valves in your gas lift program without any obligation. Otis Engineering Corporation · Dallas · Branches Throughout the Oil Country.

OTIS

Gas Lift

with WECO UNIONS





the SECRET'S in the SEAL

● If there's any secret to the success of WECO Unions, that secret lies in the perfect seal they always produce.

For WECO Unions incorporate a fundamentally correct ball and cone design which prevents leaks under high pressures, shock, surge or vibration. The spherical seat of the male sub always forms a perfect metal-to-metal seal against the conical surface of the female sub.

WECO Unions have great durability, as a result of stronger subs and wing nuts, heavier wall construction and sturdy Acme threads. They can "take it" on the toughest jobs, and maintain their efficiency under extremes of pressures, volumes and abrasions.

WECO Unions are available at supply stores everywhere, in sizes from 1" through 12", in pressures from 1,000 through 15,000 psi.

U.S.57

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

WECO

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

possible to please all of these groups . . .

"However, the Harris-O'Hara bill is a fair compromise. Informed representatives of all three interests—producers, pipeliners, and distributors—feel that it will do an effective job in eliminating the confusion that now exists . . . We need to get this bill passed at the next session of Congress. We need the strongest support we can muster . . . We have to convince our friends in the Congress that this bill needs more than votes—it needs, active vigorous, vociferous support."

H. C. Teasdel, president, The California Co., in a speech to the Rotary Club of New Orleans.

Depletion facts withheld?

"I believe that those in government who oppose percentage depletion . . . are not being entirely frank with the American public. Coincident with their protest they should tell the public that any diminution of the present percentage depletion figure would result in higher prices to the public for petroleum products and probable shortages in the future."

Frank M. Porter, president, American Petroleum Institute, in a speech before the Detroit Oil Information Committee.

Problems of business abroad

"Establishing sound economic conditions among friendly foreign nations has a direct bearing on their support of us as military allies. The U. S. Government recognizes this fact, and many billions of dollars have been given to strengthen friendly economies in the direct interests of our own security. Whether our allies are producers or consumers of oil, therefore, means that the further development of foreign oil results in less drain on our pocketbooks and more real protection for America in a tense and uneasy world. . .

"It is well to remember that, with the exception of the United States and certain small areas in Canada, the mineral rights of the free world are reserved exclusively by the governments of each country. This situation requires direct dealings by oil companies with governments.

"Involved in these dealings are such fundamental business questions as respect for contracts, discriminatory treatment, excessive taxation, the remittance of profits, and other matters in which governments can, and sometimes do, take unilateral action.

"Because of this it seems reasonable

Why J&L Supply sells CABOT Pumping Units

The demise of the standard rig and the central pumping power was accelerated by the advent of Cabot units. Here was basic improvement — a tremendous difference in price and even a greater difference in efficiency. A new era was at hand.

Cabot improvements have followed year after year, some minor, some sensational as in the case of the patented rubber tail bearing. You can fit ANY well of ANY depth and ANY potential with a Cabot.

Cabot production not only costs you less, but is infinitely more satisfactory. Nothing with moving parts could be more dependable than a Cabot. Yet parts and service are at hand in the United States and Canada 24 hours a day, seven days a week.

Character is more than skin deep — you can't evaluate a Cabot from the next lease. Investigate! Call J&L Supply now.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

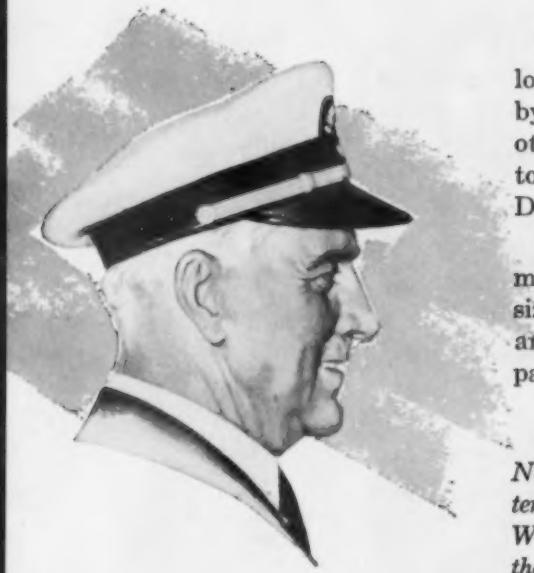
J&L – A GREAT NAME IN SUPPLIES

"Experience proves we can count on Nordberg Engines for low cost pipeline power for crude, products or natural gas"

These words are representative of the comments made by management and operating personnel of major pipeline companies in reference to the service they get with Nordberg engines for pipeline pumping and compressing service.

Hundreds of pipeline installations have proved that Nordberg Diesel, Duafuel® and Spark-Ignition Gas engines can be counted on to deliver efficient, low cost, long-term power for 'round-the-clock operations . . . on crude, products and natural gas pipelines.

". . . and we depend on Nordberg Diesels to keep our tankers on schedule"



In Marine operations, too, Nordberg engines are the logical choice for reliable, low cost power . . . as evidenced by statements made by experienced tanker skippers, and other petroleum transportation personnel who have learned to depend on the "on-schedule" performance of Nordberg Diesels.

These powerful marine engines are widely used for both main propulsion and auxiliary service in tankers of all sizes, from small Great Lakes vessels, up through Coastal and Ocean-going tankers flying the flags of many companies and many nations.

Backed by this broad experience and proved performance, Nordberg engines are your best investment for low cost, long-term power . . . in sizes from 10 to over 12,000 horsepower. We will welcome your inquiry and the opportunity to discuss the application of Nordberg engines with you.

© 1957, Nordberg Mfg. Co.

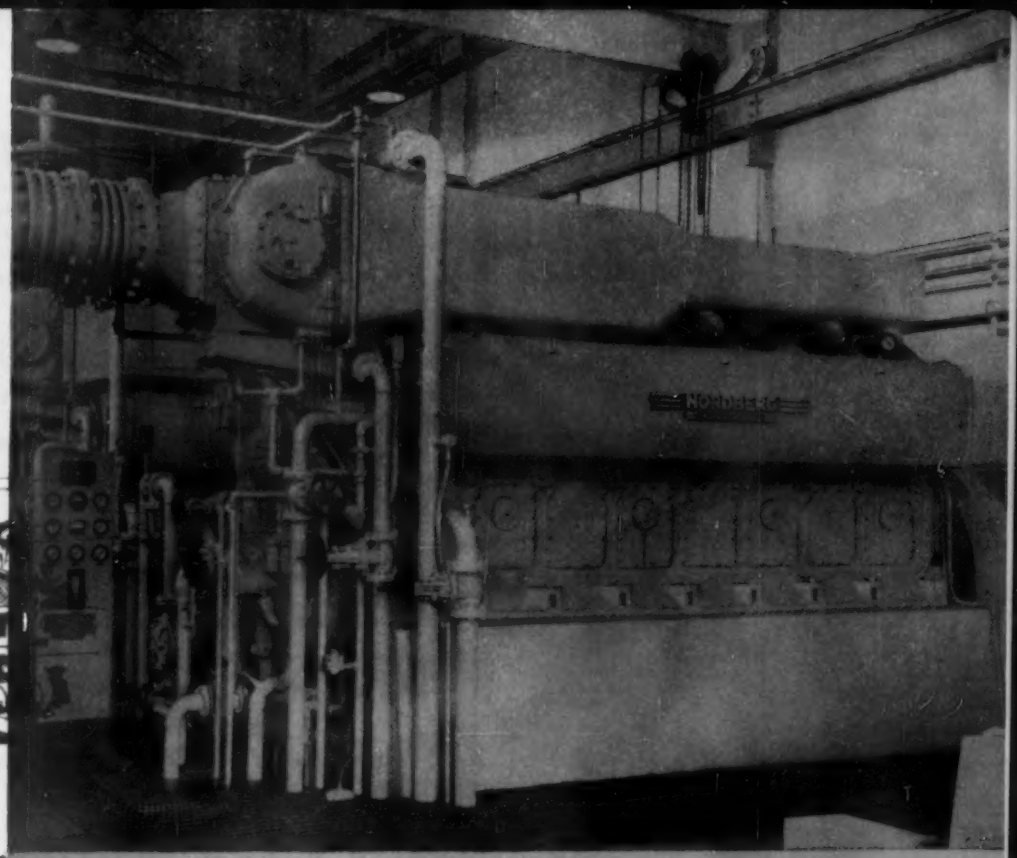
NORDBERG

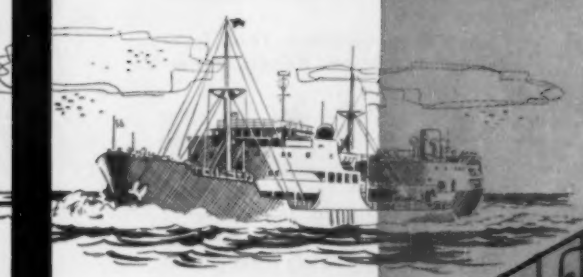
DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

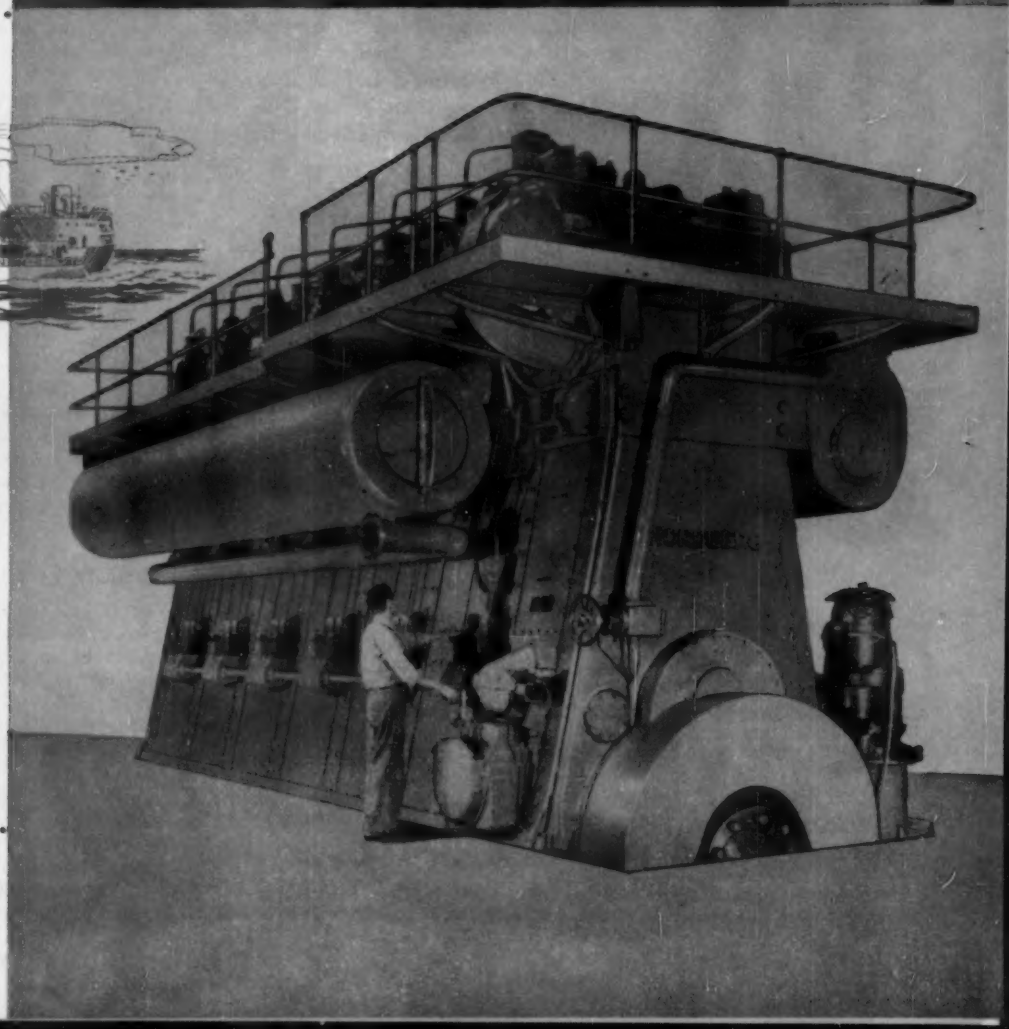
0257

NORDBERG MFG. CO., Milwaukee, Wisconsin

These 2000 hp *Supairthermal*® pipeline engines have been in operation over 20,000 hours with extremely low maintenance. They are part of a total of 24 Nordberg engines to be installed along the Trans Mountain Pipe Line from Edmonton, Alta., to Vancouver, B.C.







M/S *ISLAS MALVINAS*, large Argentine tanker, is one of three sister ships, each powered with 2 Nordberg 4250 hp 2-cycle Diesel main engines, and 4 Nordberg 465 hp 4-cycle Diesel auxiliary engines, for a total of 10,360 Nordberg Horsepower on board.

Builders of America's Largest Line of Heavy Duty Engines

Here's the safest ratchet lever hoist ever invented!

If overloaded, "safety valve handle" will bend before any other part of hoist fails.

It's the original Coffing Safety Pull, a ratchet lever hoist with dual pawls and ratchet that keep load from slipping. Safety stops prevent spinning out of control and if overloaded, "safety valve handle" will bend before any other part of hoist fails. The ¾-ton model (illustrated) weighs but 14½ lbs.

Roller Chain Safety Pull hoists are available in capacities from ¾ to 15 tons. For full details, consult your favorite supply store or write for Bulletin SP.

The exclusive *Coffing Safety Hook* with spring actuated locking latch designed to shed, not snag, on wires or other objects is available for the ¾-ton, 1½-ton and 3-ton models at slight additional cost.

DUFF-NORTON **Coffing Hoist**

DIVISION OF **DUFF-NORTON COMPANY**
818 WALTER STREET DANVILLE, ILLINOIS

Ratchet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists
Ratchet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks

for us to expect the encouragement of our Government and its assurance of support in the areas where business organizations may often be at a serious disadvantage, so that American companies can continue to compete effectively for foreign oil concessions and overseas markets."

M. J. Rathbone, president, Standard Oil Co. (N.J.), in a speech to the National Editorial Writers' Association in Oklahoma City.

TIPRO ready to bury hatchet

"There is no question but that industry differences account for most of the woes of our industry. Certainly our imports squabble is an intraindustry one, since only domestic oil companies import oil here.

"Even the beating our industry took on the gas issue resulted in the main from an inability of industry segments to compromise differences . . .

"We are willing and anxious to meet anybody half way on any of our joint problems. Independents know beyond question that they must have some degree of unity to prosper. Ours has been a defensive battle and only occasionally have we been on the offensive. No segment of the industry wins in the long run when another segment is responsible for attacks on it."

J. J. O'Brien, president, Texas Independent Producers and Royalty Owners Association.

Gas price must be realistic

"Any price so low that it will not stimulate the search for gas in its own right as a commodity and not as a byproduct can only result for the long pull in a static or declining underground inventory.

"In those circumstances higher unit costs all along the line must result in inadequate supplies of gas at prices satisfactory to no one."

C. H. Murphy, Jr., president, Murphy Corp., in a speech at the American Gas Association meeting in St. Louis.

Drillers keep rein on costs

". . . Had we contractors not held our costs at or below 1940 levels, crude oil would be so expensive that substitute fuels either here in the United States or from abroad would be much more attractive to the consumer.

"We must do everything we can to protect our markets by operating as efficiently and economically as we can. If we do not do so, we sow the seeds of our own destruction by encouraging development of alternate energy sources for our industrialized civilization."

Jack H. Abernathy, outgoing presi-

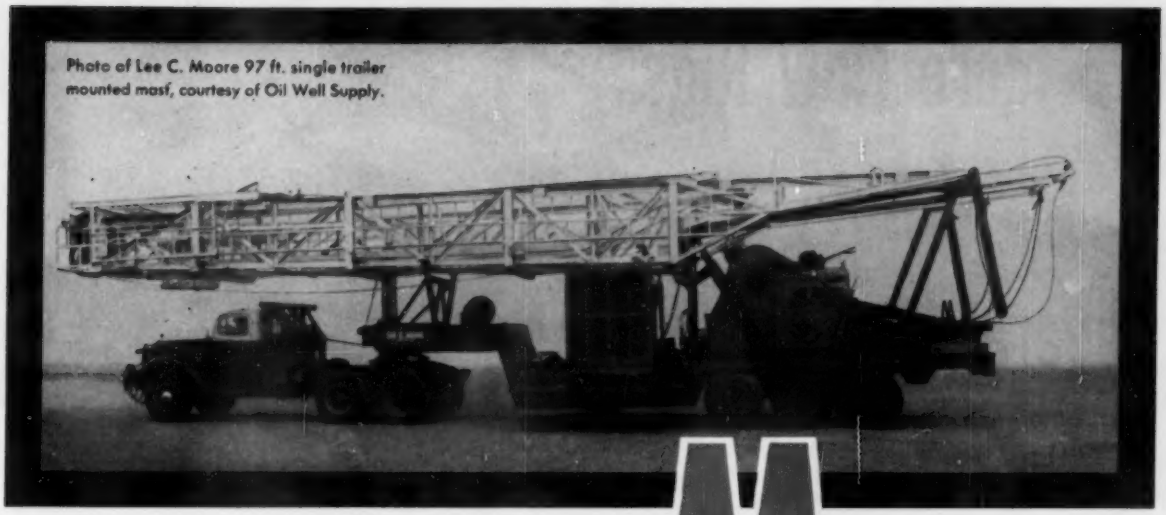


Photo of Lee C. Moore 97 ft. single trailer mounted mast, courtesy of Oil Well Supply.

LEE C.

Moore

CORPORATION

TRAILER MOUNTED MASTS

FAST SIMPLE RUGGED

LEE C. MOORE Trailer Mounted Masts are designed for maximum mobility and efficiency. Well loads are inside the mast structure, thus eliminating guy lines.

Furnished either with a substructure or with simple bearing beam and screw jacks.

Designed to accommodate a variety of drawworks and power combinations.

Extended in horizontal position — FOR SAFETY.

Legs in true alignment when mast is extended — NO OVERLAP.

Traveling blocks are carried in the mast with lines strung.

SINGLE TRAILER MOUNTED MASTS

86 ft./94 ft./97 ft./97 ft. Heavy duty /100 ft./126 ft. Export Model

DUAL TRAILER MOUNTED MASTS

97 ft./100 ft./126 ft./126 ft. Export Model

LEE C. MOORE CORPORATION — TULSA : HOUSTON : NEW ORLEANS : CENTRALIA : ODESSA : MIDLAND : DALLAS : GREAT BEND : CASPER : PITTSBURGH

EXPORT OFFICE: ROOM 624, INTERNATIONAL BLDG., 630 5TH AVE., NEW YORK 20, N. Y.

FOREIGN LICENSED MFR.: OIL WELL ENGINEERING CO., LTD., CHEADLE HEATH, STOCKPORT, ENGLAND

3 More New Rigs Get General Electric Drive for Land, Offshore Drilling

More and more rigs for both land and offshore applications are being specifically designed for electrified oil well drilling with General Electric drive systems. Here are just a few of the reasons why:

- Designed-in control simplicity of G-E drive eliminates complicated external apparatus, feed back systems, and torque limiting devices.
- General Electric drive gives you greatly increased flexibility. Fewer parts to service mean less maintenance time and expense.
- You can use General Electric drive with virtually any popular oil field engine. G-E drive is at least 85% efficient and helps eliminate mechanical drive losses.
- General Electric drive is available for a wide range of applications, including all normal drilling functions on land or offshore.

Like the operators of the three rigs described on your right, you, too, can obtain these benefits from a General Electric Drive System.

For more information, call your nearest General Electric Apparatus Sales Office or your International General Electric Sales Office. (Principal drilling offices in Dallas, Houston, New Orleans, Denver, Tulsa, and Los Angeles; Bogota, Maracaibo, Caracas, Buenos Aires, and New York.) General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 115-23

Progress Is Our Most Important Product

GENERAL ELECTRIC

1 **GREAT WESTERN RIG NO. 44,** equipped with a General Electric S-343 drilling rig package, is now drilling what may become the world's deepest hole for Phillips Petroleum Co. near Ft. Stockton, Texas.

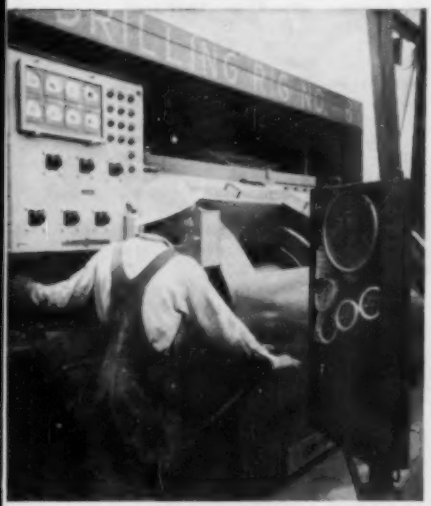
2 **PENROD DRILLING COMPANY'S JIM WOODRUFF BARGE NO. 51,** designed to drill in 70 feet of open water. G-E B574 drive system includes five G-E generators and seven drilling motors.

3 **CREOLE PETROLEUM BARGE NO. C228** is fitted with G-E drive components. Built to serve fixed or mobile platform, C228 has G-E B6743 drive system, White-Superior PTD-E8 diesels.

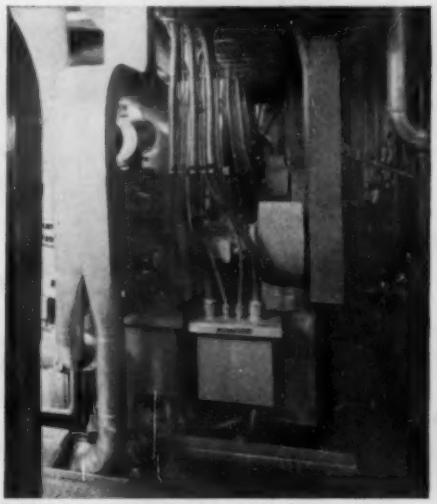
READY TO DRILL WITHIN 1½ DAYS, rapid rig-up was made possible by the portability of a G-E electric drive. Above, drawworks near derrick floor.

INCREASED FLEXIBILITY was gained with the use of G-E drive. Power skids with Cummins LRT-600 TURBODIESEL engines, G-E generators can be located "practically anywhere."

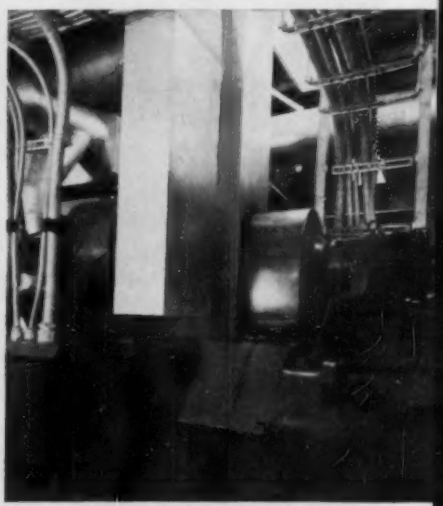
POWER CONNECTIONS ARE MADE QUICKLY with flexible cables, helping Great Western Drilling Company to speed operations.



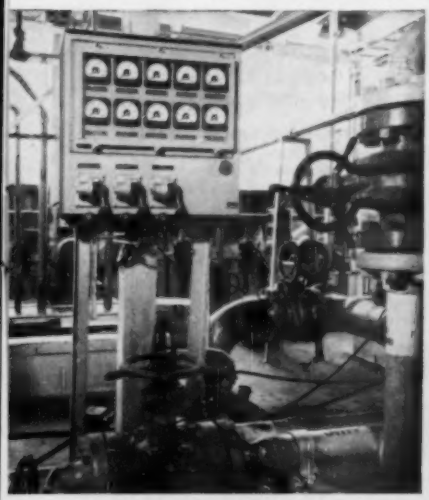
COMPACT G-E DRILLER'S CONSOLE gives operator better control of all electrically driven functions. Indicating ammeters, voltmeters are easy to read.



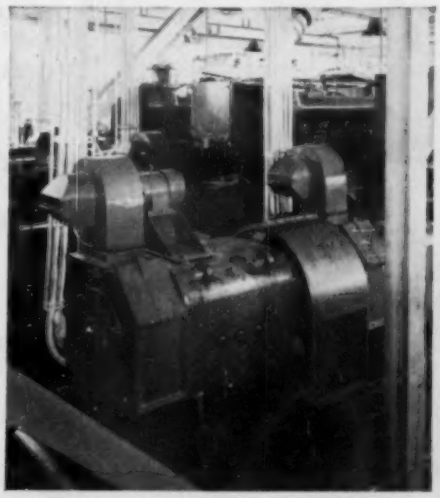
G-E 752J GENERATORS MATE PERFECTLY with Cat. D397 engines to produce reliable electrical power. Generators are reliable, easy to maintain, and have long life features.



EASIER EQUIPMENT SERVICING is made possible with G-E drive because power connections are flexible, can be easily broken.



FAMILIAR AIR THROTTLES mounted on General Electric-built pump room operator's console permit fast, accurate pump control.



COMPLICATED CONTROL DEVICES ARE ELIMINATED aboard Creole's C228. Six G-E 752 drilling generators and seven G-E 752H motors have "built-in" control, protection features.

CONTROL DEVICES ARE EASY TO SERVICE. Main d-c control cabinet has only simple contactors, relays, resistors and air valves.

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3-TUBE
Rx for pumping abrasive fluids
If you're having to pump abrasive, sandy fluid, a Harbison-Fischer 3-Tube Rod Pump is the pump you ought to be using. Because the three concentric, free-fitting tubes use the well fluid for the plunger seal, the pump is especially efficient in handling excessive float sand, dirty fluid, and in wells with unusually high bottom-hole temperatures which cause unequal expansion of close-fitting metal plungers and barrel tubes. The free-falling plunger and small bore subject the rods to less stretch and strain, and allow faster pumping rates. Since the plunger fit is not critical, friction and excessive wear of working parts are negligible, even with sand-laden fluid. The valves are fitted with standard A.P.I. balls and seats and a no-go ring on the standing valve seats off the seating area above the hold down—important features for sandy wells. H-F 3-Tube Pumps are available in 12', 15', 18', and 25' lengths in 2" x 1¼" and 2½" x 1¼" sizes from leading stores throughout the oil patch. Your store or our factory representative in your area will be glad to give you additional details and illustrated literature without obligation.
For hard-to-pump wells—or as a good, all-around pump for average wells—you can depend upon a Harbison-Fischer 3-Tube to make good production without frequent pulling jobs.
H-F
3 TUBE
ROD PUMP
HARBISON-FISCHER
MANUFACTURING COMPANY
FORT WORTH
"Best Pumps in the Oil Patch"

dent, American Association of Oilwell Drilling Contractors, in a speech at the A.A.O.D.C. annual meeting in Tulsa.

CALENDAR

OCTOBER

27-29 Independent Petroleum Association of America, annual membership meeting, Statler Hilton Hotel, Dallas.

28-30 National Lubricating Grease Institute, twenty-fifth annual meeting, Edgewater Beach Hotel, Chicago.

31-Nov. 1 American Association of Petroleum Geologists, Mid-Continent regional meeting, Education Building, Fairgrounds, Tulsa.

NOVEMBER

3-8 Society for Nondestructive Testing, second international conference, Hotel Morrison, Chicago.

6-8 Gulf Coast Association of Geological Societies, seventh annual convention, Roosevelt Hotel, New Orleans.

6-8 Society of Automotive Engineers, national fuels and lubricants meeting, Hotel Statler, Cleveland.

7 West Central Texas Oil and Gas Association, annual technical day and membership meeting, Abilene, Tex.

7-8 American Association of Petroleum Geologists, Society of Exploration Geophysicists, Society of Economic Paleontologists and Mineralogists, Pacific sections, thirty-fourth annual meeting, Ambassador Hotel, Los Angeles.

11-14 Society of Exploration Geophysicists, twenty-seventh annual meeting, Statler-Hilton Hotel, Dallas.

11-14 American Petroleum Institute, thirty-seventh annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

12-14 National Association of Corrosion Engineers, northwest region fall meeting, Penn-Sheraton Hotel, Pittsburgh.

14-15 Canadian Well Logging Society, formation evaluation symposium, Al San Club, Calgary, Alta.

14-16 Magic Plains Oil Exposition, Borger, Tex.

22 Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

DECEMBER

1-3 Interstate Oil Compact Commission, annual meeting, Tulsa.

1-6 American Society of Mechanical Engineers, annual meeting, Statler Hotel, New York.

2-6 Twenty-sixth Exposition of Chemical Industries, Coliseum, New York.

8-11 American Institute of Chemical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

10-11 University of Oklahoma, second annual conference on water quality control for subsurface injection, sponsored by the School of Petroleum Engineering, Extension Study Center, Norman, Okla.

JANUARY

16-18 Association of Oilwell Servicing Contractors, second annual convention, Baker Hotel, Dallas.

19-22 Pipe Line Contractors Association, tenth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

31 Natural Gasoline Association of America, regional meeting, Skirvin Hotel, Oklahoma City.

O-C-T CASING HEADS ARE BUILT FOR EVERY COMPLETION CONDITION

and their economy is a guarantee . . . not a possibility

The "C-19," "C-19C," and "C-20" Casing Heads offer flexibility, because they meet every well completion condition . . . they offer economy because of safety and rig-time saving.

The "C-19" and "C-19C" offer economy because load capacity is twice as great as conventional slip hangers, because

Openhole Hazards are eliminated
Slips bite evenly
Removal of blowout preventers before casing is suspended is eliminated

The "C-19" and "C-19C" save rig time because
Installation is simple and thus rapid
Sealing element, slip bowl, slips assembled as a single unit
Seal is automatic
No field welding is required

The "C-20" for medium depth wells is quick-setting, positive sealing. Same advantage of the heavier C-19 series is offered.

The Oil Center Tool Company stays abreast of oilfield problems.

That's why O-C-T Casing Heads are the finest.

Type C-19 Hanger in open position

Type C-20 Hanger in open position

O·C·T

OIL CENTER TOOL CO.

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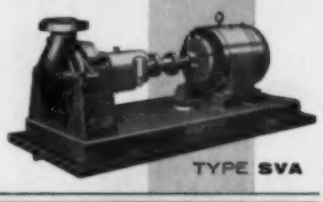
PACIFIC®

PROCESS PUMPS

give you the right answers!



TYPE **SVA**

RATINGS	TYPE SVA	TYPE SVS	TYPE SVC	TYPE RVC
Capacity — in GPM	15 to 1300	15 to 1000	25 to 3200	50 to 600
Pressure — in PSIG	To 600	To 600	To 600	To 600
Head — in feet	To 600	To 600	To 600	To 900
Temperature — °F	To 300	To 300	To 850	To 850
Number of stages	One	One	One	Two

DESIGN

PACIFIC'S skillful mechanical and hydraulic design.

MATERIALS

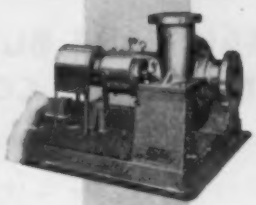
Top-quality materials of construction for the service conditions involved.

WORKMANSHIP

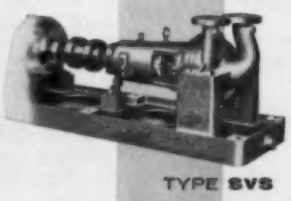
Precision workmanship by PACIFIC'S skilled craftsmen.

Included in the characteristics of all PACIFIC process pumps are the elements of unequalled quality that have made them preferred in petroleum refineries, natural gasoline plants and petrochemical installations throughout the world. For the pumping requirements of your process plant—The name to remember is PACIFIC.

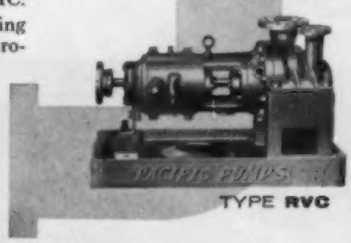
Write for Bulletins, describing and illustrating PACIFIC process pumps.



TYPE **SVC**



TYPE **SVS**



TYPE **RVC**

PACIFIC®

PACIFIC PUMPS INC.

HUNTINGTON PARK, CALIFORNIA

Offices in All Principal Cities

FEBRUARY

12-14 National Association of Corrosion Engineers, Tulsa section, ninth annual corrosion short course for pipeliners, Mayo Hotel, Tulsa.

16-20 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Hotel Statler, New York.

26-28 American Petroleum Institute, Division of Production, southern district meeting, Shamrock-Hilton Hotel, Houston.

28 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

3-4 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fourth annual joint meeting of Rocky Mountain petroleum sections, Cosmopolitan Hotel, Denver.

5-6 Gas Conditioning conference, sponsored by the University of Oklahoma, Oklahoma Memorial Union Building, Norman, Okla.

7 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

12-14 American Petroleum Institute, Division of Production, southwestern district meeting, Hotel Texas, Fort Worth.

17-21 National Association of Corrosion Engineers, annual conference, civic auditorium, San Francisco.

20-21 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, regional conference on production and reservoir engineering, Mayo Hotel, Tulsa.

24-26 Midwest Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

31-April 2 American Petroleum Institute, Division of Transportation, annual pipeline conference, Jung Hotel, New Orleans.

APRIL

1-3 University of Oklahoma, fifth annual conference on corrosion control, Extension Study Center, Norman, Okla.

9-11 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Biltmore Hotel, Oklahoma City.

15-17 University of Oklahoma, thirty-fourth annual gas measurement short course, North Campus, Norman, Okla.

16-18 Natural Gasoline Association of America, annual convention, Baker and Adolphus Hotels, Dallas.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, Louisiana-Arkansas, East Texas, and Mississippi petroleum sections, gas technology symposium, Shreveport, La.

20-23 American Institute of Chemical Engineers and Chemical Institute of Canada, chemical engineering division; Canada-U.S. chemical engineering conference, Montreal.

21-23 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Cosmopolitan Hotel, Denver.

27-29 Independent Petroleum Association of America, midyear meeting, Hotel Sherman, Chicago.

27-30 American Association of Petroleum Geologists, annual convention, Casper, Wyo.

28-29 University of Oklahoma, third annual conference on automatic control in the petroleum and chemical industries, Oklahoma Memorial Union Building, Norman, Okla.

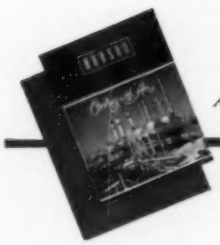
Cooling with Air AND MINIMUM WATER IN A MODERN REFINERY

Process cooling in Cosden Petroleum Corporation's new West Texas refining units is largely by direct use of air. Over 250 million BTU's per hour are dissipated directly to five billion standard cubic feet per day of air moved by 38 fans in HUDSON Solo-aire or Combin-aire units.

Solo-aire units are used where low effluent temperatures are unnecessary. Combin-aire units, in which air is first precooled with water, are used where lower effluent stream temperatures are required. The cooled water from the Combin-aires is available for other cooling services; the Combin-aires in this case performing the further function of water cooling towers. Water spray, carryover or condensation is impossible as the effluent hot air is under saturated with water vapor. Combin-aires are installed adjacent to other process equipment.

These Solo-aires and Combin-aires at Cosden, and hundreds of other HUDSON units in oil, gas and chemical processing plants confirm the advantages of cooling with maximum air and minimum water.

Before finalizing design of new process units, let HUDSON assist you in determining optimum balance in use of air and water.



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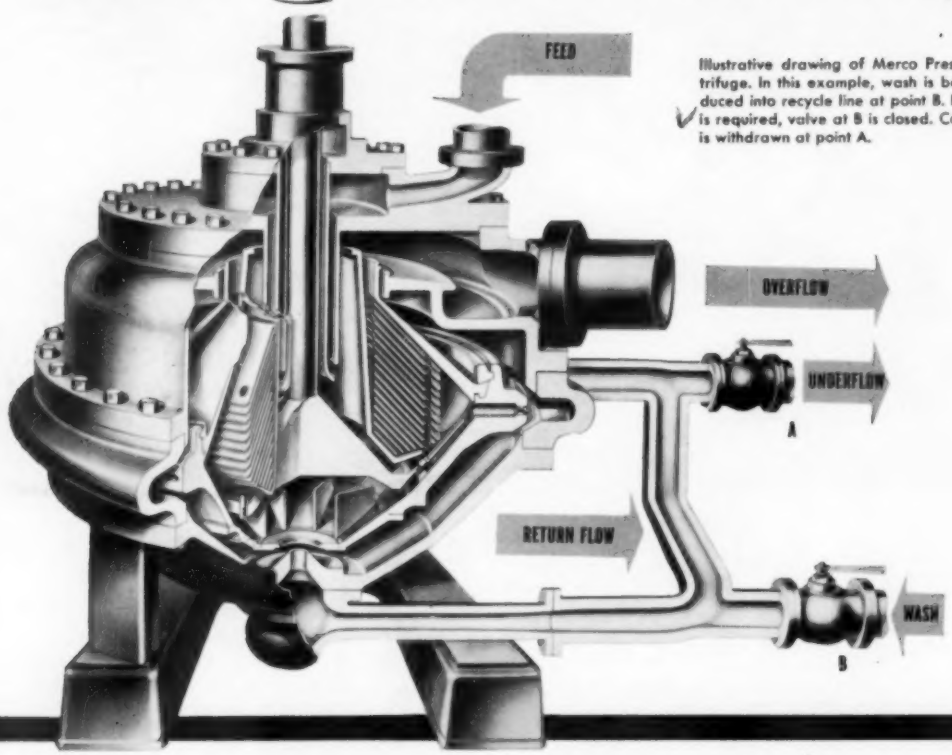
Merco Pressure Centrifuge



Illustrative drawing of Merco Pressure Centrifuge. In this example, wash is being introduced into recycle line at point B. If no wash is required, valve at B is closed. Concentrate is withdrawn at point A.

Newest development in wet processing equipment, the Merco Pressure Centrifuge is designed for all continuous centrifuging applications at pressures up to 110 psi. Key to pressure operation is a specially designed housing closure that has been exhaustively tested at pressures two to three times the guaranteed figure of 110 psi. Equally important, this new unit incorporates the unique Merco "Return Flow" principle for maximum operating flexibility. Under centrifugal forces thousands of times higher than gravity, even the smallest particles in the feed "sink" rapidly outward and are continuously expelled through fixed open nozzles in the rotor. A controlled portion is withdrawn as finished concentrate and the remainder becomes a return flow to the rotor. Wash, if desired, is introduced to the return flow line . . . clear, excess liquor overflows out the top of the unit.

If there's a step in your flowsheet involving concentration, washing, clarification, soluble recovery, or classification *under pressure*, there is a good chance that this new tool will prove useful. Bulletin No. 2600, just off the press, describes the Merco Pressure Centrifuge in detail. For your copy, write Dorr-Oliver Incorporated, Stamford, Conn.

Merco T.M. Reg. U. S. Pat. Off.

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Check these positive advantages . . .

Pressure Operation — Concentration, washing, clarification, soluble recovery or classification can be carried out under pressure.

No Solids Build-up — All solids entering the unit are continuously discharged. Return flow flushes solid material at periphery of rotor.

No Nozzle Clogging — Return flow principle permits nozzle flow 2 to 10 times as great as the underflow actually withdrawn. Merco nozzles will discharge particles as large as 1/32 inch.

Practical Design — All separating conditions are controlled externally. The unit is equipped with a sturdy housing which has been X-rayed and hydrostatically tested.

The OIL AND GAS JOURNAL

TULSA, OKLAHOMA

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JOURNALLY SPEAKING

Very Unfunny

WE KNEW things were getting pretty tough in the oil business, what with money tight, drilling off, allowables low, prices weak, and demand poor.

But just how serious the situation is was forcibly brought home to us by a recent incident in—of all things—Houston, Tex.

It happened to John Spears, the Journal's advertising manager on the Gulf Coast. John likes to mix a little humor with his selling, but his most recent gag backfired in a way that was almost disastrous.

He was just about to close a big advertising contract and was feeling so good about it all that he figured to clinch the deal by handing his client a laugh.

So he pulled out a notebook labeled "Texas Scratch Pad," made a couple of notations, and then tore out the page and tossed it toward the wastebasket.

At this point the advertiser noticed that the pages of the "notebook" were crisp one-dollar bills (see cut). He hit the ceiling. The performance struck him as exceedingly unfunny.

The way John tells it, his man was so agitated at this gesture of contempt for a perfectly good dollar—even in the oil business—even in Texas—even as a joke—that he almost canceled the contract.

Yup, things are tough all over. But there's an encouraging note here. If there is such a scarcity of dollars in Texas oil circles, perhaps there will also develop a scarcity of those tall tales and malicious myths about "oil-rich Texans" and their alleged disregard for money, public opinion, and the gasoline consumer.

It's about time. Such stories used to be amusing. But they have done the oil industry much harm. They have become so much a standard part of the repertoire of professional and amateur comedians that today nobody will believe that anybody in the oil business could possibly have any financial worries.

For instance, just the other day the book reviewer of the New York Times started his review of a dog book with this:

"Everybody has heard of the story of the Texas oil baron who bought a small boy to play with his big dog."

What the industry needs is some stories about oil-poor Texans.

Sprechen zie Deutsch?

MAYBE you've already heard of the aeronautical engineers' new English-German glossary.

It is said to be of great value in international communications by standardizing terms pertaining to guided missiles and such. But somebody who did a little research says it was worked up by a bunch of guys in a car pool. However that may be, here are some samples:

Guided missile: Das schientifiker geschuterwerke Firenkrakker.

Rocket engine: Firenschpitter mit schmoken-und-schnorten.

Liquid rocket: Das skwirten jucenkind Firenschpitter.

H-bomb: Das eargeschplitten Laudenboomer mit ein grosse hollengraund und alles kaput.

Research team: Das whizkidden Gruppe.

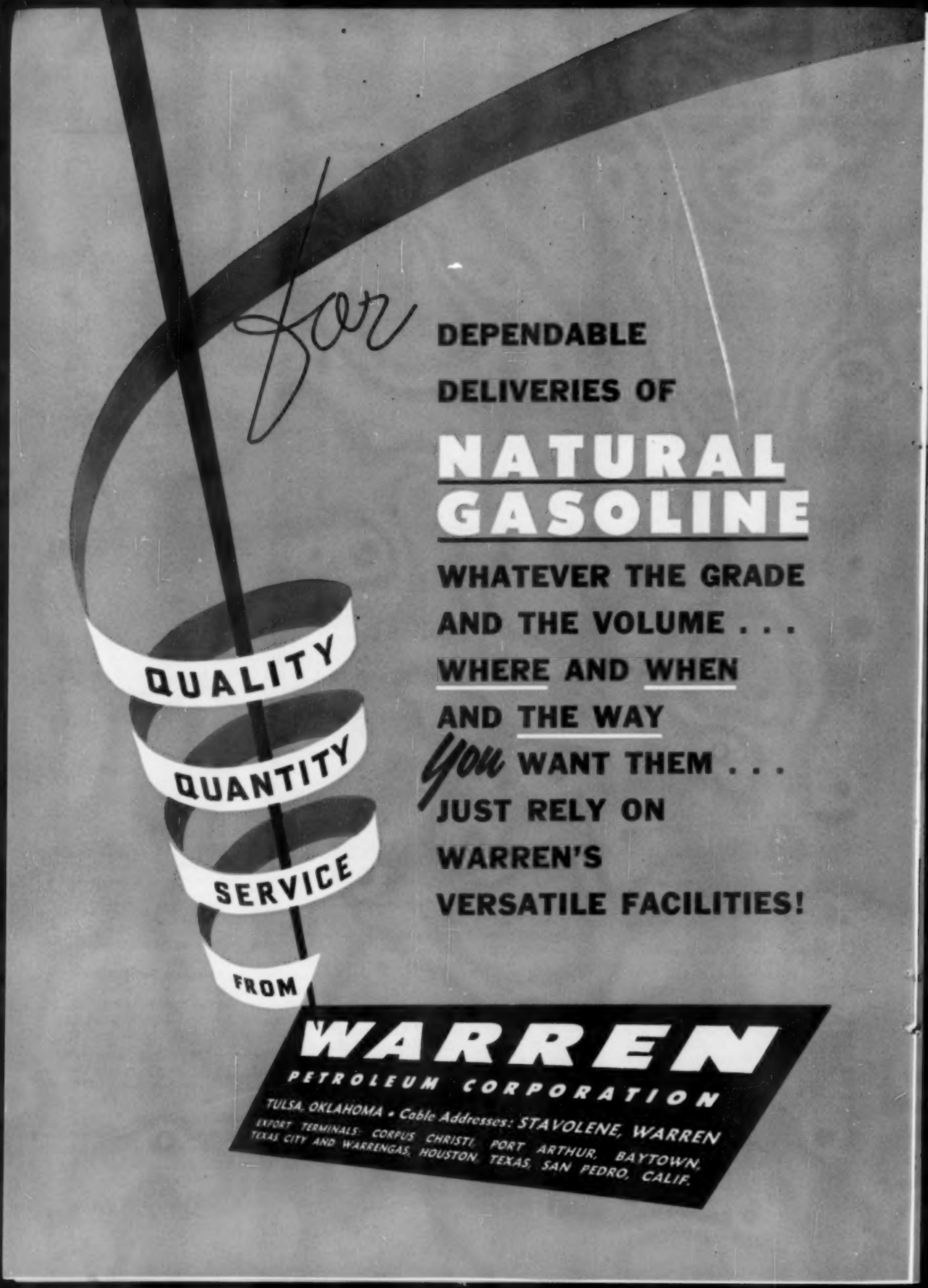
Design department: Das uppen-dasklaudsen Gruppe.

Administration: Das oudtgeschmardten Gruppe.

Our engineering editor, G. L. Farrar, got so intrigued with this that he dusted off his college German to the point where he calls our publisher "Der toppedogge uf der grosse yalerbukke," and himself "Ein peonische mit alledirteschwerken in den technikalische kopywritenvolke."

If you have any communications problems in your outfit, this glossary idea has unlimited possibilities. But you'll have to take it from here.

—Henry D. Ralph.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How to get the gas bill passed

SUPPORTERS of the Harris-O'Hara gas bill are chewing their fingernails over the chances of getting it through Congress next year. But they don't seem to be doing much effective work toward insuring its enactment.

They make speeches to each other about its importance. They distribute statements to an apathetic public about details of gas costs and accounting procedures. They count congressional noses and speculate on the strength of the coal industry's opposition.

In between times they accuse each other of not showing enough enthusiasm for the bill, or of holding out for their special interests.

WHAT THEY OUGHT TO DO is to go after the heart of the opposition, namely the gas-distributing companies. And you can't win a heart with a meat axe. It takes a sympathetic attitude and friendly persuasion.

Pious public pleas for industry unity won't help distributors to understand the problems of gas production and pricing. What is needed is to educate the distributors personally, one by one.

An example is John Heyke, president of Brooklyn Union Gas Co. He was one of the most effective opponents of the first Harris bill. It took months of patient missionary work to make a convert out of him, but today he is an ardent supporter of the new Harris bill. He admits that much of his early opposition was based on misunderstanding.

A flock of converts like John Heyke would remove the hard core of opposition to the bill. The best way to get them is for individual producers to sit down with individual distributors and quietly explain exactly how the present utility-cost method of wellhead pricing is bad for distributors.

Some distribution companies are beginning to find this out for themselves. As intervenors in various producer rate cases they are coming to grips with specific examples of the insuperable problems and inconsistencies of the rate-base formula as applied to exploration and production.

And several of them are beginning to weaken. They are suggesting that cost data need not be applied literally and inflexibly but should be modified by other factors of judgment and economics in determining a reasonable price for gas in the field.

THIS IS HALFWAY to the Harris bill. A little more missionary work may induce these distributors to forget cost accounting entirely and support the bill's definition of reasonable market price.

Producers are convinced that if the bill fails, the present cost method will fall of its own weight eventually and distributors will learn the hard way that a new approach is imperative. They could learn it the easy way—the way John Heyke was brought into the fold.

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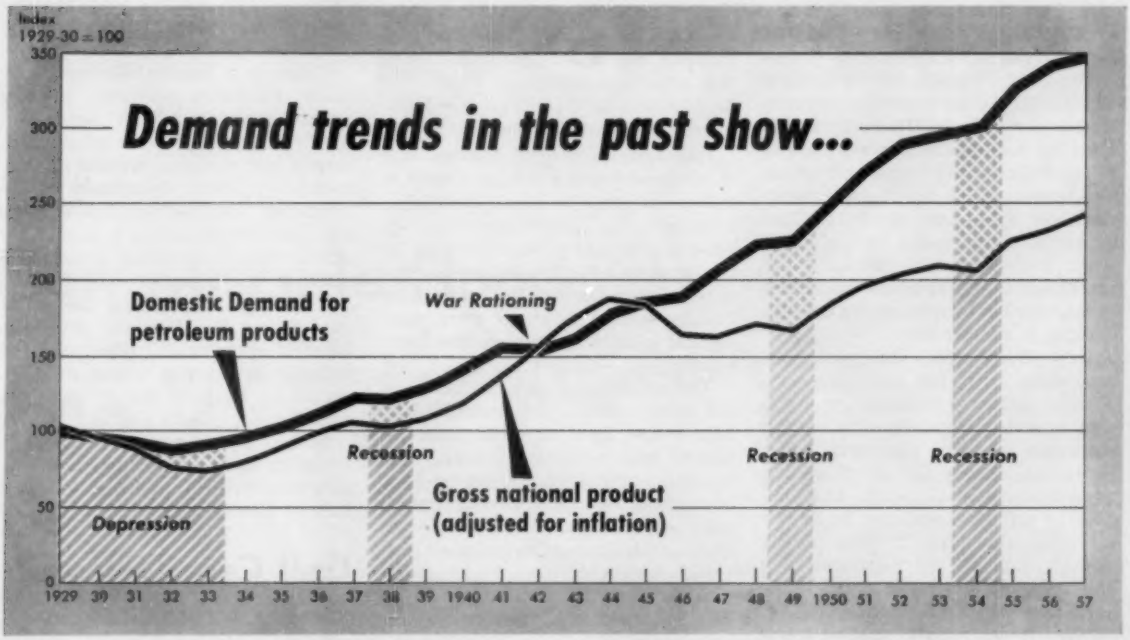


Oil Can Ride Out an Economic Upset

● Dips in the general economy hit oil less hard than other industries. This has been a rough year on oil, but it may point to an above-normal demand gain.

WAVERING PRICES on the New York Stock Exchange last week confirmed what already was apparent to many economists. The boom in the nation's economy is slowing down.

When oil-company shares took a clipping along with those of other substantial concerns, oil men quickly sought answers to two questions:

What's happening in the oil industry to justify this apparent lack of confidence?

If a business adjustment is really in the books, how will oil fare in the downturn?

The answers simply put are these:

Oil men have experienced a year of tough problems in 1957. But a close exanination of the industry both at short and long range fails to reveal any serious dislocation which should jar confidence.

As for a recession, experience in past years shows that oil demand rides out the adjustment period much better than the general economy and bounces back quickly when the upturn sets in (chart). In two postwar recessions, oil demand did not fall at all. It just leveled for a few months and then rose again.

If storm comes . . . How the oil industry reacts in periods of depression and recession is shown in the chart.

It shows demand for petroleum products does not fluctuate as much as other items in the national economy.

There was only a mild decline in oil demand during the major depression of the early thirties. The 1938 recession was, for oil, more of a period of adjustment than actual decline.

Greatest relative shift in petroleum demand came during the war years. This was distorted, however, because the program of rationing cut civilian consumption.

The postwar recessions of 1949 and 1954 caused only a slowing down of domestic demand—not an actual decrease. Two cycles have marked this postwar period: A short 3-year cycle in petroleum demand ending in 1949 and a 5-year cycle ending in 1954. After each cycle sharp upturns were recorded in oil demand.

If oil demand shows only a moderate gain next year to complete another cycle, the period should be followed again by a sharp gain the following year.

The chart shows these trends more clearly by comparing domestic demand for petroleum products with the gross national product — the market value of all goods and services produced. This value is taken before deduction of depreciation charges and

other allowances for business and institutional consumption of durable capital goods.

Gross national product normally is expressed in current dollars. But since they have a changing value with inflation, the series used here was converted to values expressed in terms of dollars. Since G.N.P. is in dollars and domestic oil demand is in barrels daily, both series have been expressed in the chart as yearly percentages of the averages for 1929-30.

The sturdy position of oil demand then becomes clear when the two lines are compared. In fact, the only period when the over-all economy went ahead of petroleum was in wartime. Then oil was rationed, and the national economy was boosted greatly by production of military goods.

Insulation . . . The current Chase Manhattan Bank report points out oil's position in another way.

John G. Winger, the bank's oil economist, says the two most important uses of petroleum are fairly well insulated from the effects of a moderate business adjustment. The individual's day-by-day use of the automobile is not curtailed. The volume of oil consumed for heating is not materially affected. Thas is why over-all demand for petroleum was able to show a gain in both of the postwar business adjustment years.

Winger sounded this note of warning, however: The industry can weather on economic adjustment better if it has its house in order. Both the 1949 and 1954 adjustment periods were entered with excessive inventories. Stocks are high now, but they can be returned to good levels if the industry quickly gears supply rates to actual requirements.

Some explanations . . . Every analyst is voicing his own idea of what factors in the general economy are contributing to the stock-market jitters.

But very few point to any developments within the oil industry itself that clearly explain what happened to the oil shares.

The outlook for oil-company profits is good. Profits for the first half of 1957 showed a gain of nearly 19 per cent over the same period in 1956. Reports on the third quarter are just coming in. Most are favorable. Indications are also that most oil companies will show a profit gain in 1957 over the previous year.

The oil industry has had plenty of headaches in the first 10 months of the year. Most of them, however, already have been either offset or discounted long before the stock market reaction.

Total demand for oils, for example, hit the skids from January through May due to a combination of circumstances nearly all attributable to unseasonable weather or the aftermath of the Suez crisis. But since then demand has come back and now is nearly even with the 1956 level.

Supply also was out of joint for a time when the Suez crisis ended and imports began to move into this country again in volume. This has been whipped into better shape, thanks to two actions: Cutbacks in production by prorated states and imposition of the voluntary-control program.

Inventories are high, but the rate of accumulation has slowed. Stocks of crude and gasoline have been sliding seasonally for several months. Middle-distillate and residual stocks on the contrary have climbed faster than normal since spring. But even these can be worked down to more manageable levels with the advent of cold weather.

The crude price picture also is on the steady side. A few isolated price adjustments have occurred since the general raise earlier in the year. Most, however, have been caused by local competitive situations. Distillate prices have stayed at summer rates longer than usual. Seasonably cold weather would bring the prices back in line.

The soft spots . . . The general unsettled conditions also have resulted in some domestic operating soft spots —notably in drilling and production.

Well completions started falling abnormally below last year in mid-March and only headed above last year's level in September. Number of active rotary rigs has trailed 1956 activity all year until August and still lacks its old bounce.

As a result of this drilling slack, the business of service and supply concerns also dipped noticeably. Both these segments of the industry, however, shared the boom in foreign work started by American oil companies. This meant that for some, domestic losses were offset by foreign work.

Producers who prospered when output was kicked up to supply Europe during the Suez blockade, were pinched by the post-crisis adjustment. But in the over-all picture, they fared pretty well.

A report by Chase Manhattan Bank concerning the oil-production situation in Texas pointed out these facts: In the first 9 months of this year, Texas has had a total of 135 allowable days compared with 144 in the same period last year.

But with nine fewer producing days in 1957, the same amount of oil has been produced as in the previous year—834 million barrels.

The bank study explained: "Thus, it is evident that, while allowable cutbacks have hurt some producers, there are others in the state who must have enjoyed higher production."

The outlook . . . Most oil economists feel that when all the figures are in, 1957 still will be a fair year for oil—not quite so good as had been expected but still above normal.

It's early to predict with much certainty, but many observers still see some demand gains for next year. J. W. Ferguson, director of the economics and statistical division of Continental Oil Co.'s department of coordination and planning, in a Tulsa talk last week predicted a 2 or 3 per cent growth in domestic demand for oil in 1958.

The long-term outlook for oil is even better. Based on the petroleum needs of an expanding population and industry to serve it, demand is expected to increase sharply over the next 9 years (OGJ, Oct. 21, p. 68).

In fact there's nothing apparent in either the short-term or long-term outlook for the oil industry to cause lack of confidence.

Gulf Case Delayed

Justice officials talk to Texas about boundaries

WASHINGTON.—An effort to settle, in advance, some of the issues in the gulf-state boundaries case is slowing up Supreme Court action in the matter.

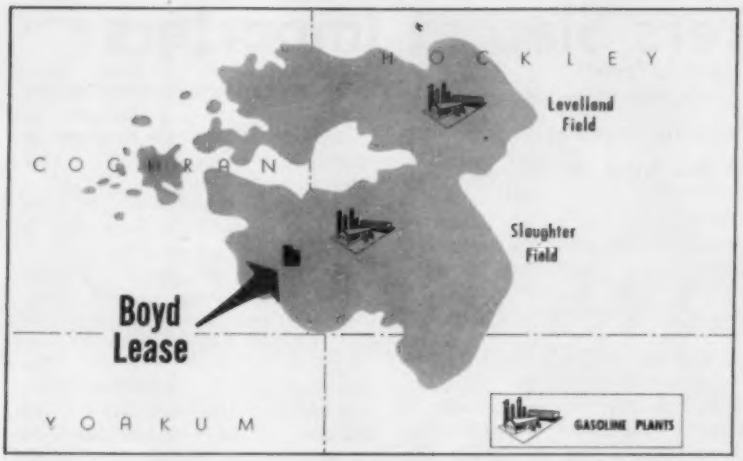
The Justice Department last week asked the court for another 30 days in which to file an amended complaint. The court told the department to file the complaint in the event all gulf states failed to enter the case voluntarily.

The basic suit is against Louisiana and seeks to fix the state's offshore boundaries—an issue important to the oil industry.

The department said it asked for the delay because talks with Texas officials are now going on.

All gulf states were brought into the case last June, when the court denied the Government's plea for an immediate decision on Louisiana's boundary.

The court gave the states 60 days in which to intervene. Those failing to do so will be brought into the case by the Government in an amended complaint. Alabama was the only state to accept the invitation. Mississippi refused, and Florida and Texas did not reply.



New Miscible Flood

. . . planned by Atlantic Refining in huge Slaughter field. It calls for propane, gas, and water and is expected to more than triple primary recovery.

DALLAS.—Atlantic Refining Co. is aiming at West Texas' huge Slaughter field as the proving ground for the latest in miscible-phase recovery techniques.

The company last week asked for a Texas Railroad Commission permit to launch a full-scale project in the San Andres under its 1,247-acre H. T. Boyd lease in the west central part of the big field in Cochran county.

Atlantic figures primary recovery from the Boyd's San Andres pay to come to only about 20 per cent of the roughly 32,000,000 bbl. estimated in place originally. It already has produced about 4,900,000 bbl. or about 15 per cent of original oil.

The pioneering new type of project, Atlantic believes, will boost total oil take from the pay to about 62 per cent of original oil. This would mean an added 16,000,000 bbl.

The miscible program will net about 8 per cent more of the original oil than would a water flood. The percentage would be even higher, Atlantic figures, if it were dealing with an entire reservoir rather than a lease surrounded by other producing leases.

Slaughter, with its 83,000 acres, is just too bulky to be operated as one big unit. But the life of primary production in most of the field is ebbing fast. Atlantic places depletion now at 75 per cent. Some form of secondary recovery will become a necessity in the next few years.

Atlantic estimates that, if the type of program it plans were to be adopted field wide by other operators via cooperative projects, recovery from Slaughter's San Andres pay could be hiked a startling 1 billion barrels.

Boyd timetable . . . Atlantic hopes to have its Boyd project in full operation by June.

It will convert three of the lease's 35 wells to injection service. These inputs will inject:

. . . 255,000 bbl. of propane in a 6 to 8-month period. It will chase this with

. . . 3.4 billion cubic feet of gas over 2½ to 3 years, then switch over to about

. . . 6,000 bbl. of water daily. Water input will be continued until the pay is depleted as far as possible.

Why the water? . . . Atlantic will use the water to improve what its laboratory research work found to be a low-areal sweep efficiency for the slug method (OGJ, July 15, 1957, p. 59).

This means that, though the propane chased by gas will sweep clean wherever it reaches, it won't touch a considerable part of the total reservoir rock. Water injected behind the gas, however, will help counteract this.

Ideally, Atlantic thinks, water and gas should be injected simultaneously behind the gas band to get the most oil out. This wasn't considered feasible for the Boyd operation, however, since the lease can't be isolated from surrounding production. Migration of oil off the lease is the big problem.

Pressure stepup . . . Reservoir pressure in the area now is down to about 640 psi.

When the propane is injected and gas input started, Atlantic says it will have to maintain a pressure of about 1,300 psi. at the gas-propane interface in order to obtain the miscible effect. This means a needed surface injection pressure of about 2,000 psi.

With such pressure, oil will be forced away from the inputs and toward lease lines. Atlantic engineers think they can maintain a miscible sweep using such pressures only up to the point where 34 to 35 per cent of the pay has been swept before too much oil would begin to migrate across lease lines.

The plan is then to let pressure drop back to a level comparable to that of neighboring leases and carry on with a conventional low-pressure water flood.

Higher allowables . . . To help prevent excess migration of oil across lease lines, due to high-pressure injection, Atlantic asked the commission to grant higher allowables for the Boyd wells up to a probable lease maximum of 2,200 to 2,800 bbl. daily.

It proposed rules which would provide credit against gas-oil ratios for the propane, gas, and water injected.

Atlantic also asked that allowables be boosted sufficiently from time to time by the commission as the need should arise to prevent or minimize oil migration.

Representatives of some other Slaughter operators asked that the commission require a hearing on any future allowable increase over the present lease limit. They included Pan American Petroleum Corp., The Texas Co., and Humble Oil & Refining Co.

Cities Service Tops Bidding

EDMONTON. — Oil companies paid $14,186,590 to the Alberta Government at a recent sale of 62 crown-owned tracts.

Canada - Cities Service Petroleum Corp. was the biggest buyer. The company paid $2,646,148 for nine parcels. Three were in the Keystone area and six in Pembina field. The biggest bonus for a single tract was $826,011 paid by Midwest Oil Corp. for a half-section in the Bellshill Lake field of east-central Alberta.

Thirty-six parcels in proved areas brought $6,583,219 while 22 tracts in semiproved areas brought $1,665,-079 and 4 wildcat tracts brought $5,938,292.

Texas Lawmakers Slap at Importers

Members blame foreign oil for their money woes, propose three resolutions and one bill to whip importers into line. Governor will decide if session can take up oil subjects.

AUSTIN, Tex.—Texas legislators, angry over plummeting oil-tax revenue, are pushing three resolutions and one bill to punish oil importers.

Gov. Price Daniel called the legislature into special session to deal specifically with lobbyist-control and water conservation but is being asked to open it up to oil legislation.

The antiimport resolutions so far introduced—and referred to house committee—would:

... **Prohibit** Texas land-leasing boards from leasing acreage to importing firms which do not comply with the U. S. Government's voluntary import-control program.

... **Direct** the Texas Board of Control to terminate, by any legal means possible, all contracts between the state and oil importers or their affiliates. Bids submitted by importers on contracts to supply petroleum products to the state would be discarded.

... **Urge** U. S. Senate Majority Leader Lyndon Johnson of Texas to sponsor a bill in Congress taxing oil imports at $1.50 per barrel.

In addition to the resolutions, one bill has been prepared that would give the Texas Railroad Commission authority to limit an oil company's production in proportion to its imports into the U. S.

Money problems . . . The clamor for action against importers has risen steadily as state revenue from oil production has fallen. State Comptroller Robert S. Calvert issued a revised revenue estimate showing an anticipated $6.5 million treasury deficit for the biennium—instead of the surplus that had been expected.

Declining oil production is almost entirely responsible for the drop in expected revenue.

Crude production for September this year amounted to 71,299,733 bbl., compared with 85,976,453 bbl. in September of last year. Value of the crude was $222 million this September, compared with $243.5 million in September of 1956. The drop in value occurred despite an intervening increase in crude prices.

Texas tax revenue accordingly dropped more than $1 million in September, compared with the prior September. The take last year was $11,363,949 and this year was $10,348,325.

Governor Daniel has not stated yet whether he will allow the legislature to consider other legislation, but some members believe he will open it up because of the tight revenue situation.

The Lee bill . . . Rep. John Lee of Kermit has submitted an antiimport bill to Daniel in the hope he will get executive support for its introduction and passage during the special session.

The Lee bill, which limits crude-oil production in Texas by importers, would do these things:

... **Require** the Railroad Commission to consider imported oil when fixing the production allowables for Texas.

... **Regulate** crude-oil purchases in accordance with the distributed allowable.

... **Reduce** the allowable of wells owned by importers in proportion to the amount of oil they import.

The bill, Lee said, will help prevent waste, boost drilling, readjust allowables, and prevent loss of millions of dollars to the state in oil-tax revenue.

The resolutions . . . Rep. Truett Latimer introduced the resolution to knock out contracts held by the state with oil importers.

It requires the Board of Control to study all current contracts with importers or their affiliates and terminate them—if legally possible.

To prevent future contracts from being made, the resolution requires oil

Four Corners Line Goes Piggy Back

THIS SPAN of the new Four Corners Pipe Line across the Little Colorado River is known as a "piggyback" crossing. The 16-in. crude-oil pipeline was built in the overhead trusses of a bridge on U. S. 89 at Cameron, Ariz.

The 660-ft. section of line weighs more than 54,000 lb. and is more than 80 ft. above the stream bed. Inspecting the crossing are Harold Butcher, left, and Earl Travis of Shell Pipe Line Corp., which is building the system for Four Corners Pipe Line Co. Four Corners Pipe Line is owned by Shell, Standard Oil Co. of California, Gulf Oil Corp., Continental Pipe Line Co., Richfield Oil Corp., and Superior Oil Co.

companies to submit sworn statements, when bidding on oil, gasoline, or lubricant contracts with the state, that they are not importers of foreign oil or products, nor are they affiliated with any such firm.

The resolution states that the economic structure of the State of Texas and livelihood of its citizens "are in serious danger due to the flood of tax-free foreign oil produced by cheap labor abroad and imported into the U. S."

State Rep. George Wilson introduced the resolution asking Senator Johnson to sponsor legislation in Congress taxing crude-oil imports.

The argument for imposing the duty is contained in the resolution itself, which states that "millions of barrels of foreign oil, costing about $1 a barrel, are being merchandised throughout the U. S. on a $3 per barrel market, thereby increasing the profits of major importing companies to the financial detriment of the great State of Texas and its people."

"Unemployment is increasing at an alarming rate throughout the oil industry," the resolution says, "and state revenues are decreasing at such a rapid rate that new and burdensome taxes will probably be inflicted upon the people of Texas."

The resolution declares that hundreds of Texas wells have no pipeline connections and give poor financial returns, and in some counties the sale of crude production is insufficient to pay operating costs.

The independent producer is pictured in the resolution as facing "financial bankruptcy unless the noose placed around his neck by the world oil cartel is loosened."

The resolutions, if passed, would not have the force of law but would authorize the governor to carry out their provisions where he could legally do so.

Sun Settles Tanker Suit

SUN OIL CO's $150,000,000 suit against World Tankers Corp. has been settled amicably.

The suit was an outcome of differences of interpretation put on the Sun-World Tankers contract, signed in 1955, when the Suez situation arose.

Both Sun and World Tankers, a Niarchos holding, said "the sincere differences of opinion" which led to litigation both in the United States and Great Britain "have been amicably resolved" and that they have resumed contractual relations.

watching WASHINGTON

. . . with Bertram F. Linz

No tax cut, lots of probing . . .

HERE'S how things are shaping up for the next session of Congress: Tax reduction ideas now appear to have been discarded. Sputnik did the trick. Missile and satellite development will be pressed with all speed.

Pipeline opposition to end-use controls may kill the Harris gas bill. Coal interests say they will fight any bill without such controls. The big question is: How much support can the bill count on if the coal industry opposes it?

The fight to cut the industry's depletion allowance will center on foreign production. The argument will be that, without depletion, companies operating abroad would contribute to our own tax revenues. Administration opposition to a cut, if backed up by Democratic leaders, would kill the idea, however.

Industry practices will be investigated by several committees on both sides of the Capitol. But the Justice Department is stepping up its anti-trust attack, and that may influence investigating committees to hold back any bills aimed at the same objectives.

One thing about the 1958 session is certain: Every big move by congressmen will have its political aspect. Add to that friction over civil rights and debate over defense and the result may be little legislation on other than major matters.

Pipeline issue is up again . . .

IT'S almost time for new decisions on whether the Government will back Texas-to-seacoast pipelines.

Both the Texas-West Coast and the Gulf-East Coast pipeline projects are again under study in the Government, as they have been annually for several years.

The two projects were revived on the basis of the import-control program. But West Coast Pipeline Co. has an added argument. California production is declining and import control makes a new crude line important.

West Coast plans now call for 30-in. pipe instead of the 24-in. line proposed in the past. The company is asking a government guarantee of loans needed to build the system.

The Gulf-Atlantic pipeline also is under study again. The Office of Defense Mobilization is awaiting another report from the Interior Department. Past reports opposing the pipeline, however, give little hope of a change of the department's position.

Carson tough, gets support . . .

CONGRESSMEN from the oil-producing states are pleased with the way Capt. M. V. Carson, Jr., is handling his job of controlling crude imports.

Carson's tough attitude, as shown in his denial of all pleas for quota increases except two based on errors, is in sharp contrast to former Mobilization Director Flemming's timid attempts to cut back imports.

The domestic industry also is pleased. But it would feel still better if it could prevent the military from buying foreign products. The charge that this goes far to offset the benefits from crude control may lead to changes in policy.

Carson, speaking for the cabinet committee, has warned the industry against any efforts to get around the import limits by bringing in products. And the cabinet committee soon will make a new study of West Coast imports. Those are the angles Washington will watch closely.

All this may add up to an easing off of agitation for formal quotas threatened when extension of the Reciprocal Trade Act comes up in Congress next year.

HUDDLING before a House judiciary subcommittee opens its hearings into pipeline operations are, left to right, Rep. Emanuel Celler, chairman; Kenneth B. Keating, subcommittee member; and Asst. Atty. Gen. Victor Hansen.

Pipelines Under Fire

● Justice Department puts FBI agents, accountants, and lawyers to work. House committee also opens a probe

WASHINGTON.—The Justice Department is turning its biggest guns upon the nation's pipelines. Its announced aim is to "restore" competition in that segment of the oil industry.

The new assault encompasses these moves: An all-out FBI probe of lines owned jointly by major companies, studies of pipeline practices and trends, and case-by-case prosecution of violations of the 1941 consent decree.

The department's program was revealed by Asst. Atty. Gen. Victor R. Hansen, antitrust chief. He appeared at opening of hearings on consent-decree enforcement last week before a House judiciary subcommittee.

Hansen's review of what is being done was designed to answer critics. They have charged that the department has been dragging its feet on enforcing compliance with consent decrees.

Subcommittee Chairman Emanuel Celler of New York found it worthy of remark that the department did not file its first suits in 16 years until just before the hearings.

Celler told Hansen the subcommittee has no intention of interfering with the prosecution of those cases. But he said also that their filing would not deter the subcommittee from its investigation.

What's involved . . . The 1941 decree was aimed at preventing oil companies from profiting unduly from their ownership of pipelines.

It limited the dividends they could receive to 7 per cent of the valuation of the common-carrier property of any pipeline through which they shipped.

The decree was expected to lower rates for moving oil of producers who did not own the pipeline. In many cases, the department found it has not done this.

The pipeline companies subject to the decree are required to file annual reports with the department. From the very first, some on the antitrust staff believed the lines were not complying with the decree.

But there was a difference of opinion in the antitrust division. While repeated recommendations for prosecution were made by the staff, top officials through several administrations have turned them down.

Over the years, three separate investigations of compliance have been made by the FBI. The department was informed early this year that the House committee was probing its inertia.

What it means . . . The administration's new antitrust program could result in an effort to divorce pipelines from other segments of the industry.

The purpose of the consent decree was to eliminate undue competitive advantage to shippers stemming from special connections with carriers, Hansen testified.

But there is also "an approach under the antitrust laws themselves to the problem of the competitive effects of major oil company ownership of pipelines," he said.

Celler indicated that proposals have been made to change the laws on consent decrees. The change would allow injured private parties to secure redress for damages suffered prior to the entry of a decree.

The department has passed up the idea of a general suit to enforce compliance, Hansen said. It now plans to file suits against individual companies which are felt to be violating the decree. Some of these will be contempt cases in which no money is involved. Others will be aimed at recovering allegedly excessive dividends paid to shipper-owners.

Beyond the issues involved in the four suits already filed, there are other situations in which there are possible violations, Hansen disclosed.

These include the making of false reports to the attorney general; payment of principal and interest to shipper-owners on both prejudgment and postjudgment loans without changes in valuation bases; failure to place excess revenues in restricted surplus accounts; misuse of surplus accounts; failure to retain interest on surplus-account funds and failure to file reports.

A broad study . . . The department, at the same time, is making a continuing inquiry into pipeline ownership and operation as part of its study of production and marketing problems.

Special concern is felt about the role played by pipelines in both marketing and transportation of crude, Hansen said.

These studies cover the competitive effects of many practices and industry trends, including pipeline and purchaser proration and unconnected wells.

"Control over transportation, some have complained, has put independent producers of crude completely at the

mercy of the major oil companies," Hansen explained.

Finally, the antitrust chief said, "we have launched a full-scale FBI investigation of all crude and products pipelines jointly owned by the major oil companies to detect any anticompetitive aspects of the joint ownership.

"This is one of the most comprehensive investigations undertaken by the department in recent years. I can assure you that it will go forward as rapidly as possible.

"My hope is that the department's antitrust and judgment-enforcement program will ultimately help eliminate whatever pipeline abuses do exist and thus restore competition in this phase of the petroleum industry," Hansen added.

Hansen repeatedly objected to questions by subcommittee counsel designed to bring out details of staff discussions and memoranda on the pipeline problem. The information, he said, would help the companies now being sued and weaken the Government's position.

"You're asking me for evidence of the FBI that I need in the pending cases," he protested at one point.

Valuation method . . . Much of the hearing was used to explore the methods followed by the Interstate Commerce Commission and American Petroleum Institute committees in developing the valuation of pipelines.

Activities of the A.P.I. committees were given in detail by James E. Moss, director of the transportation division, and Fayette B. Dow, chairman of the committee on pipeline accounting. The work of the engineers, accountants, and valuation committees was defended by J. L. Shoemaker, financial vice president of Service Pipe Line Co., and chairman of the group.

The valuation committee always has confined itself to the valuation of properties by the ICC, Shoemaker said in a statement prepared for the subcommittee.

The committees, as well as pipeline company personnel who work with the ICC, do so at the request of the commission. A clause in the Interstate Commerce Act gives the ICC power to call on transportation industries "to cooperate with and aid" it in the valuation work.

Charges answered . . . The hearings afforded the first chance for companies now being sued for noncompliance with the 1941 consent decree to answer the Government's charges before a responsible body.

J. L. Burke, president of Service Pipe Line Co., denied there has been any effort on the part of his company to evade the decree.

"We feel that the Department of Justice may have interjected itself into this situation without having the background, statutory authority, or the facilities for undertaking the rate regulation in this industry which in effect the consent decree undertakes to do," Burke said in a statement prepared for the subcommittee.

"We hope that this committee, in its investigation of the consent decree, will consider whether the department was warranted in invading an area that Congress intended the Interstate Commerce Commission to cover."

Burke denied the charges of filing false statements raised by the Government. It did not inflate the dividends paid its shipper-owner, Standard Oil Co. (Ind.), he asserted.

There are "doubtful areas" in the decree, however. In cases where these are reached, the company has talked with and sought the advice of Justice Department officials, he said.

"The decree provides very heavy penalties, in the form of treble damages, for any overpayment of dividends," Burke pointed out. "On this account, we at all times exercised the utmost caution in avoiding any payment which might subject us to penalties.

"Our parent company also watched this carefully and insisted on being assured that it did not receive any dividend payments which involved any risk of penalties."

Times are different . . . Burke's statement pointed out that there have been great changes in pipeline operation in the past quarter century. Originally built largely as plant facilities or refineries, pipelines today are actively competing for traffic from independent operators, he said.

Economic factors make it desirable to build the largest possible line and operate it at capacity, Burke explained. Rates have been reduced and minimum tenders cut.

"We are intensively engaged in soliciting additional movements from anyone we are in a position to serve, in active competition with other pipeline common carriers," Burke said. "Whatever may have been the situation more than a quarter of a century ago, for some time now there has been and exists today a very real rivalry for the transportation of crude oil for the independent refiners.

"These facts as to our company portray a somewhat different picture of our common-carrier operations than is generally understood. The fact is that the entire pipeline business has changed immensely in the past 25 years."

Canadian Strike May Spread

PROSPECT of a refining-marketing strike throughout British Columbia last week highlighted oil-industry labor developments.

The province-wide strike may result from a stalemate in union-management efforts to end a strike of Oil, Chemical and Atomic Workers Union members at the Ioco refinery of Imperial Oil, Ltd.

The 250 employes at Ioco walked out September 23 after Imperial rejected a conciliation board award. The decision gave the union a security clause, reclassification of categories, and overtime improvements.

C. L. Barber, president of the British Columbia local, said the union has asked British Columbia government for conciliation proceedings. Under British Columbia law, a general strike cannot be called until conciliation process is completed. This may take 2 or 3 months.

Barber commented that if conciliation results do not suit the union it has no other choice than to strike all processing works and marketing outlets in the province. The 900-member local represents most of the employes of British Columbian refineries and marketing outlets.

In other oil labor fronts, these developments turned up:

. . . Standard Oil Co. of California and Independent Union of Petroleum Workers are expected to resume bargaining sessions within a few days. Talks over a new contract have been deadlocked since June 21. Union says negotiations are being revived after California Standard made a new offer covering improved health-insurance-pension benefits.

. . . Esso Standard Oil Co. has started talks with agents of Independent Petroleum Workers Union. Management wants to consolidate 15 crafts in the mechanical department into three sections.

. . . O.C.A.W. has asked National Labor Relations Board for a representation election among more than 900 production and maintenance workers at the West Tulsa refinery of D-X Sunray Oil Co. Union claims majority of affected workers have signed cards authorizing O.C.A.W. to represent them in collective bargaining.

PRIVATE PLANES find a greater use in oil than in any other industry. This one is used by Tom C. Gipson, Calvert Drilling, Inc., superintendent, to reach rigs in the Four Corners area. But the market could be even bigger. A survey shows that . . .

Oil Men Want Their Planes Improved

- **Tomorrow's business aircraft should be faster, able to make longer flights at higher altitudes with safety**
- **Executives polled by the Journal also are demanding a cheaper plane, less expensive to operate and repair**

ONE TREND has been developing in the oil industry almost unnoticed within the last 10 years: Use of aircraft has increased so much it is now an intergral part of day-to-day operations.

The oil industry owns nearly 17 per cent of the nation's fleet of privately owned planes. It is aviation's top industrial market. These aircraft now serve all divisions—exploration, drilling, production, field processing, pipelining, refining, petrochemical, and marketing.

Because of the airplane's rise in stature as a prime industry tool, the market-research department of The Oil and Gas Journal undertook a special study. Goal of the survey: Find out how planes are helping oil-company operations and determine where improvement and betterment are needed.

What's needed . . . A lower price tag for airplanes apparently is the prime concern of most oil companies whether they operate single or multiengine craft.

Typical comments from oil men on this score:

"Give us at least a five-place twin-engine plane with all instrument-flight-rule requirements as to equipment and performance for less than $50,000."

"More economical twin-engine plane is needed for smaller company use—put a good twin-engine plane on the market at a price of $25,000 to $30,000 complete. Put more stress on light twin-engine aircraft that are pressurized for above-weather flight and can operate at 15 and 20 thousand feet safely."

On bigger aircraft comment runs like this:

"We need a business aircraft capable of 300-400 miles per hour, pressurized, turboprop with about 10-passenger capacity within economical purchasing reach of $250,000 to $400,000."

"Pressurized cabin, over 200 miles per hour, 1,800-mile safe range under $150,000 cost."

Oil-industry officials also express frank comments on new design features they want incorporated in tomorrow's business aircraft.

Increased safety factors are paramount, they say. Many would achieve this by increasing the visibility in cockpits, installing more radar and automatic-pilot equipment, and using better radios.

Operators of smaller planes ask that manufacturers increase their range and build more speed into the aircraft with less cost per pay load and less capital investment.

Operators of bigger craft used by oil companies suggest more pressurized cabins to allow higher altitude flying. They also mention giving planes longer range, higher speeds and greater passenger loads. These oil men likewise want more dependable accessories, greater economy of operation, and improved short-field characteristics in their multiengine planes.

Maintenance a headache . . . Criticism of present service and maintenance conditions is unusually heavy.

A large majority of oil companies declare the aviation industry needs to adopt standard parts and service facilities for faster and more economical maintenance. Repairs now are too high, parts very expensive, and delivery slow, many operators complain.

Much of this criticism on service hits right at the doorstep of the men who operate fixed-base facilities. Many plane owners say service is slow, often incompetent, and facilities are inadequate for handling transit craft.

One comment puts the need pertly: "Prompt, courteous service, good mechanics, competent ground handling without charging for extras that are gratis at automobile filling stations."

From the welter of criticism, the Journal survey concludes that fixed-base operators should consider these improvements:

. . . **Step up quality** of their personnel.

. . . **Train personnel** better.

. . . **Improve facilities** for handling customers by furnishing better waiting rooms, better transportation to and from fields, and provide better weather information.

. . . **Study charges** they make and either explain them more satisfactorily or reduce them to a realistic level.

Why buy a plane . . . The oil industry at times in the past has received

unfavorable publicity for its alleged use of plush aircraft for flying oil men on all varieties of excursions.

The Journal survey at least explodes this myth. Oil companies say they buy planes simply as a matter of logistics: Getting the right man to the right place at the right time.

The second-place reason for using private planes is for sales aid. Service to customers is third, and cargo-hauling is only a minor factor.

These reasons run fairly true to form among owners of both single and multiengine planes.

All of the oil men interviewed also state that benefits from use of business aircraft help the oil industry function more efficiently.

Time saving is the greatest benefit. This isn't quite as obvious as it might seem. Time saving becomes even more important with these considerations: Customers can be supplied with technical assistance more quickly. Key personnel can be shifted to remote areas at the right time. Customer relations are vastly improved by servicing points not reached by commercial airlines.

Airplanes also are listed as a management tool. They enable company officials to keep in closer touch with branch offices. They make for better management of company personnel in all divisions.

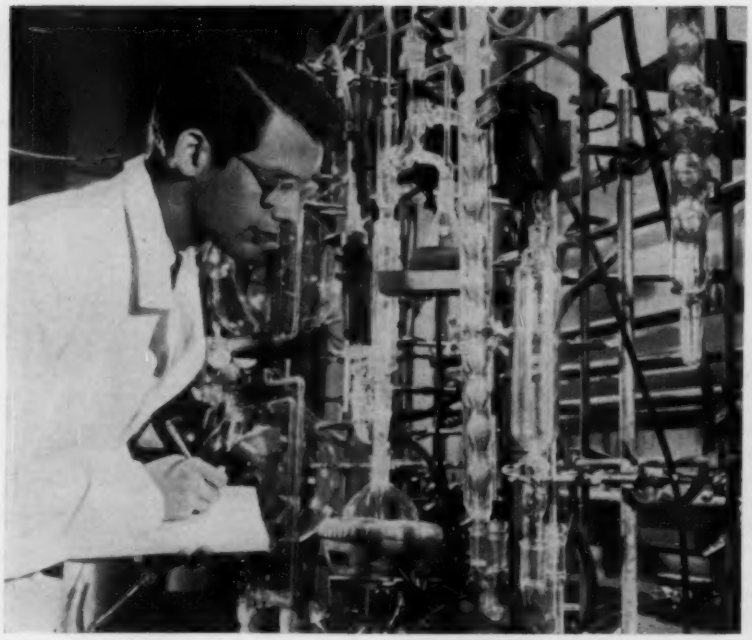
Who buys . . . One thing is clear for oil-industry aircraft: Decision for buying planes rests solely with management.

Opinion elicited in the survey is almost unanimous on this point. Several companies report that men below management level have some voice in the decision to buy. But in the final analysis, buying an airplane for business is a function of management.

And evidently management is seeing that efficient use is made of the planes. Users of single-engine planes say they fly their planes from 200 to 400 hours per year, with 300 hours the most common usage. The multiengine planes are flown from 150 to 1,200 hours a year with 500 to 600 hours the most common.

Most of the smaller planes on the average carry two passengers plus the pilot. The multiengine craft average three passengers plus pilot.

One interesting comparison between the smaller and larger planes is developed in the study. It seems that oil men who fly in the small planes do very little paper work or hold few conferences while in flight. But those traveling in the larger company planes tend to carry on their work or conduct business conferences on the planes.



New Lab Promises Tailored Polymers

SUMMIT, N. J.—A new horizon for petrochemicals is indicated in the growing talk about controlled catalytic polymerization of numerous petroleum-based olefins. Celanese Corp. of America has just announced a step-up in its research in this field.

The promise of tailor-made, or "ordered," polymers parallels the progress in refining, when the more specific catalytic cracking replaced random cracking by thermal means.

Celanese, with a new polyolefin pilot reasearch laboratory at Summit, considers itself on the inside track in this work. Its tailored ethylene polymer, Fortiflex, is now in commercial production. Celanese foresees the ability to make other polymers to order from propylene, butylene, and the heavier olefins.

The new laboratory will bridge the gap between bench-scale work and commercial application. It will make these new tailored polymers in quantities large enough to be checked out in conventional plastic fabricating equipment.

T.G.T. Buys Texas Production

HOUSTON.—Tennessee Gas Transmission Co. has added about 110 billion cubic feet of natural gas and 1,500,000 bbl. of liquid hydrocarbons to its systems through three purchases in South Texas.

The purchases included nine gas-distillate wells and three other wells being drilled. The transactions involved 3,851 acres of leases in Hidalgo and Karnes counties. Purchase price was not disclosed.

The company acquired one-half working interest in 1,787 acres of leases in the Weigang area of Karnes County from C. C. Winn and Milton V. Spencer, both of San Antonio. One gas-distillate well has been completed on this property, and a second well is being drilled.

In another purchase, T.G.T. acquired one-half working interest in 1,756 acres of leases in Hidalgo County from Horace C. Hargraves, Dallas. The acreage is in Northeast Monte Cristo field, where three gas-distillate wells have been completed and a fourth well is being drilled.

The other purchases involved full working interest in 308 acres of leases in Tabasco field, also in Hidalgo County. The property was acquired from a group including George Coates, San Antonio; V. F. Neuhaus and Hugh Kirkpatrick, both of Mission, Tex.; and R. H. Abercrombie, Houston. The property has five gas-distillate wells, all connected to the T.G.T. pipeline system.

A.P.I. Honors Lewis

M.I.T. professor to get Gold Medal for pioneer work that helped build the petroleum industry

THE MAN who pioneered fractionation in the petroleum industry and won distinction as the father of modern chemical engineering will receive the industry's highest honor in November.

Dr. Warren K. Lewis of Newton, Mass., will be awarded the Gold Medal for Distinguished Achievement by the American Petroleum Institute at the A.P.I.'s thirty-seventh annual meeting in Chicago, November 11-14.

The presentation to the 75-year-old professor emeritus of chemical engineering at Massachusetts Institute of Technology will be made at the first general session on Monday afternoon, November 11.

Dr. Lewis built a world-wide reputation in petroleum research during 43 years at M.I.T. before accepting emeritus status in 1948. He became an authority in many phases of chemical engineering, both in and out of the petroleum field.

He is perhaps best known as the man who first generally applied fractionation in refining. He developed or played major roles in perfecting solvent-recovery systems, vacuum distillation of lubricating oils, and fluid catalytic cracking.

Fundamental research by Lewis led to significant discoveries on the structure of liquids, the flow of heat and liquids, gasification of coal, and synthesis of hydrocarbons. He is an authority on the fluid-solids technique in petroleum refining and applied the vapor-liquid equilibrium concept to crude-oil production from new wells. He also helped develop the drilling-mud technique.

A contributor to oil conservation methods, Dr. Lewis helped develop water-drive systems for displacing crude.

A busy life . . . Lewis was born in 1882 in Sussex County, Delaware, and attended schools at Laurel, Del., and Newton before entering M.I.T. and taking a chemical engineering degree in 1905. He received his doctorate in chemistry from the University of Breslau, Germany.

During his long career at M.I.T., where he rose to head of the department of chemical engineering, he became a consultant to such corporations as General Electric Co. and Standard Oil Co. (N. J.) and served in government research posts during both World wars.

DR. WARREN K. LEWIS
...an award for work well done.

In World War II he was a key adviser on the Manhattan (atom bomb) project.

Not all of Lewis' contributions to the industry have come from the laboratory. He has been a teacher and developer of other great figures in the industry—such men as Esso's E. V. Murphree, Du Pont's C. H. Greenewalt, and Goodyear's R. P. Dinsmore.

Perhaps more than any other man, the M.I.T. professor has made the petroleum industry chemical engineering-minded and influenced its key leaders to think more along creative lines.

Frank M. Porter, A.P.I. president, announced the choice of Lewis as the Gold Medal winner. Last year's recipient was Col. J. Frank Drake, former president of Gulf Oil Corp. The first award, in 1946, went to Henry Ford. The medal winner is not necessarily an oil man.

Kermac Scores Offshore

NEW ORLEANS.—Kerr - McGee Oil Industries, Inc., last week passed up 16 potential pay zones to settle on a seventeenth as a new reservoir in its Block 28 field in the Ship Shoal area.

On a production test the well flowed at a rate of 4½ million cubic feet of gas per day with 70 bbl. of condensate per million feet. The perforated interval is 13,642-60 ft. Total depth was 14,175 ft. The test was made on a 14/64-in. choke.

The well is the F-1, just west of the field discovery well, completed at 8,500 ft. in 1948 as a gas-condensate producer. Kermac said the hole cut 16 other sands below 8,600 ft., all of them apparently carrying gas condensate.

Kermac owns a ⅜ interest in a 5,000-acre block on which the well is located. Partners are Phillips Petroleum Co. and Southern Natural Gas Co.

Refiners Get Break

Military makes changes to help smaller inland plants

WASHINGTON.—Small inland refiners will get a better break on military contracts under new policies of the Military Petroleum Supply Agency.

As a start, such refiners will be allowed to submit bids on jet-fuel purchases set aside for small contractors on the basis of exchange agreements with major companies.

This will extend military buying to inland plants which produce jet fuel but can't deliver it at distant points at a competitive price. The inland refiners have long complained of their inability to break into the big military market.

The same device is expected to be used later to bring the inland refiners in on the purchase of Navy Special and No. 6 fuel oil. In both of these programs, part of the purchase will be set aside for small business.

Here's how the plan will work: A small inland refiner will be free to bid on the set-aside if at the time of bidding he has an exchange agreement with a major company on a product-for-product basis.

The agreement must be between a small refiner and a major who can market the small refiner's product in his own area and can furnish similar product at the point of delivery.

Exchanges must be in a stated ratio on a refined product for refined product basis without a monetary settlement. And the product exchanged for product offered and delivered to the Government must be manufactured by the bidder.

It is expected that this system will substantially increase the small business participation in military procurements, according to Rear Adm. O. P. Lattu, executive director of the MPSA.

Canada Starts Probe

. . . to find out if Trans-Canada Pipeline is giving producers and consumers a square deal. Six-man commission named

OTTAWA.—Canada's Prime Minister John Diefenbaker, in one of the first legislative acts of his new Progressive Conservative government, has set up a six-man royal commission to probe into operations of the Trans-Canada Pipeline Co. and other national energy problems.

Diefenbaker gave the commission wide latitude in its investigations but asked it specifically to decide whether consumers along Trans-Canada's 3,100-mile line are paying fair prices and if producers get fair returns.

The full story on stock options and reserved blocks of shares for company officials probably will be told during the inquiry.

Canadian politicians looked on the move as a natural from the Progressive Conservative standpoint. The present government previously had battled to kill the original deal when the Liberal government, then in power, sponsored it.

Diefenbaker's action now places the Liberal government's pipeline policies on the griddle and starts the ball rolling toward a national energy policy, an old Conservative pledge.

The commission is headed by Henry Borden, Toronto industrialist and president of Brazilian Traction, Light & Power Co. Members are J. Louis Levesque, Montreal investment broker; Dr. George Britnell, head of the economics department of the University of Saskatchewan; George Cushing, vice president of the Canadian Labor Congress; Leon Ladner, Vancouver lawyer; and Dr. Robert Howland, Halifax, N.S., who served as an economist with the Gordon Commission.

The agenda . . . Here are some of the jobs given the royal commission:

. . . Inquire into the Trans-Canada operation and determine whether special measures are needed to safeguard the interests of Canadian gas producers and consumers. In particular, the commission will check the relationship of Trans-Canada to the Northern Ontario Pipeline Crown Corp. and the nature of the corporation's financing and control.

. . . Study and recommend policies on export of energy and sources of energy.

. . . Investigate conditions and recommend policies concerning transmission of oil and gas between Canadian provinces and other countries.

. . . Study prices and rates for oil and gas and recommend any action needed.

. . . Investigate the financial structure and control of pipeline companies with a view toward setting proper prices.

The commission is expected to check reports from the city council of Winnipeg that Trans-Canada is overcharging for domestic gas and, from Vancouver, that British Columbia consumers are being charged by Westcoast Transmission Co., Ltd., double the price that is being charged for gas exported to the U. S.

Immediately after Diefenbaker announced appointment of the commission the government of Manitoba began preparation of a brief asking that a public authority be placed over Trans-Canada and rates charged by it.

FTC Hits Socony

Firm charged with trying to influence auto dealers

WASHINGTON.—The Federal Trade Commission is adding to its growing list of complaints against the oil industry.

Its latest move is against Socony Mobil Oil Co.—"the nation's second largest integrated petroleum concern and its sixth largest industrial corporation," according to a complaint based on exclusive dealing charges.

Socony is alleged to have influenced auto dealers and other customers to discontinue competing lines of oil and grease. It did so by making equipment available to them as a gift or loan or on easy buying terms, and providing construction, painting, paving, or other benefits.

The cost of some benefits so given, the FTC charged, does not bear a reasonable relation to the profits to be made on the prospective customers' oil and grease business.

The practices of the company have the effect of hindering and lessening competition in violation of Section 5 of the Federal Trade Commission Act, the complaint alleged.

Socony is granted 30 days in which to file its answer to the complaint. The case has been set for hearing January 8.

—— *Industry* briefs

Louisiana's production allowable for November has been set at 782,800 bbl. per day. This represents an increase of 8,372 bbl. daily over the October allowable to permit production from new wells. Actual production is expected to fall short of the allowable because of recent cutbacks in purchases by Esso Standard Oil Co.

A drilling barge which capsized in the Gulf of Mexico 6 months ago has been salvaged and may return to work in offshore oil fields. The "Mister K" was turned upright after being towed upside down from the gulf up the Mississippi River to New Orleans. Nine persons lost their lives when the vessel overturned in the South Pass area last spring (OGJ, Apr. 22, p. 87).

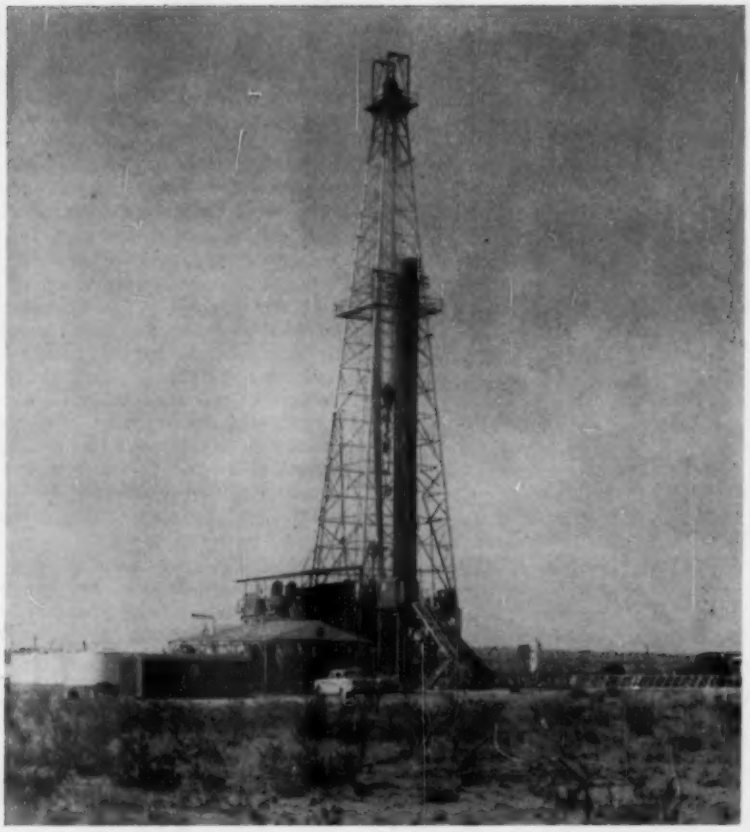
Chaco Petroleum, S.A., has spudded its first well on a 900,000-acre Bolivian concession formerly held by Glenn McCarthy, Inc. Chaco is a subsidiary of Tennessee Gas Transmission Co. Other participants in the Bolivian operation include subsidiaries of Union Oil & Gas Corp. of Louisiana, Lion Oil Division of Monsanto Chemical Co., and Murphy Corp.

First test to be drilled by the new operators is the Los Monos 5, projected to 7,000 ft. It is a mile south of Los Monos 4, a shut-in gas well.

Unitization of the giant Rangely oil field in northwestern Colorado October 1 has resulted in a daily production drop of about 5,000 bbl. to an average of 64,522 bbl. a day.

Production declined after wells producing a high ratio of gas were shut in, according to C. L. Pickett, western division production manager for The California Co. Calco is the unit operator under the agreement which calls for reduction as rapidly as possible of gas flaring. Pickett said production will start climbing in a few weeks through increasing the output from lower gas ratio wells.

J. Ray McDermott & Co., Inc., Waterford Oil Co., and Warren Petroleum Corp. have abandoned their wildcat 25 miles off the Caribbean Coast of Nicaragua at 15,400 ft. The test was on an 11,000,000-acre oil and gas concession from the Nicaraguan Government held jointly by the three companies. The concession extends along the Caribbean Coast and covers both onshore and offshore territory. Future drilling plans have not been announced.



Deeper, deeper, to 21,601 ft. . . .

Texas Well Is Nearing Record

FORT STOCKTON, Tex. — Pan American Petroleum Corp.'s record-breaking deep test in Pecos County last week drilled to less than 1,000 ft. from a new world deep-drilling mark, and it was still drilling.

The 1-CS University reached 21,601 ft.—just 969 ft. from the world record of 22,570 ft., held by the Richardson & Bass et al 1-L Humble-L.L.&E. in South Louisiana.

The Pan American wildcat is now more than 2,500 ft. deeper than any other well ever drilled in Texas. At its current depth, the bit was still boring monotonously through Barnett shale of the Mississippian in search of the Devonian. It has been drilling through this shale for more than 2,720 ft. and now is carrying more than 5,100 ft. of open hole.

The 1-CS University has pushed past its amended contract depth of 21,500 ft., and Pan Am is expected to decide whether to keep on drilling or give up the venture as a bad deal. The Parker Drilling Co. rig now has been on location 393 days.

Broken and rebroken . . . Meanwhile, the former West Texas drilling record of 18,771 ft., which the Pan Am test dissolved last summer, has been busted again.

Phillips Petroleum Co.'s 1-EE University, another Pecos County rank wildcat about 12 miles east of Fort Stockton, was drilling below 18,900 ft.

Hearing Set on 22-Cent Gas

WASHINGTON.—The Federal Power Commission will decide in hearings starting November 21 whether to approve the highest price yet asked for gas from Bayou des Allemands area of Louisiana.

Wm. T. Burton Industries, Inc., has applied to FPC for authority to sell gas at the rate of 22.55 cents per 1,000 cu. ft. Burton wants to market between 9 and 12 billion cubic feet of gas annually to United Gas Pipe Line Co.

The 22.55-cent price includes the Louisiana 1-cent gathering tax and .3-cent severance tax.

Du Pont Tells How It's Fighting Rising Maintenance Costs

GALVESTON, Tex.—The Du Pont Co. is attacking the growing maintenance problem in its plants with a four-point program that reduces downtime and helps insure company profits.

Du Pont reports that new industrial techniques and production demands have shoved maintenance into a role of major significance in the petroleum and chemical industries. Maintenance costs have risen drastically, and these costs must be justified.

The Du Pont system was described at the twelfth annual meeting of the South Texas Section of the American Institute of Chemical Engineers by O. S. York, manager of the Maintenance Engineering Section of the Engineering Service Division, E. I. du Pont de Nemours Co., Inc.

What's happened . . . The high cost of maintenance today, compared with pre-World War II, is evident from payroll figures. Since 1940 total wage personnel has risen 150 per cent at Du Pont, but maintenance labor has jumped 250 per cent. And the maintenance labor roll is increasing twice as fast as all other wage rolls.

Advanced technology—processes that are more complex—is responsible for the big change. Such things as special control valves, graphic panels, and photometric analyzers, and the use of new engineering materials, such as plastic piping systems, have multiplied the problems of the maintenance division of manufacturing plants.

Plant operation also has changed. Processes now are tied together, in contrast to the old "batch" type operation, and this increases the importance of keeping each portion of the process in working order.

York says that the maintenance performance of a plant today has a much greater influence on profits and return on investment than it once did. As Du Pont approaches the continuous plant operation, it becomes "more and more important to operate the plant with minimum outage and high-quality production."

The Du Pont way . . . Du Pont's four-point approach to maintenance calls for improvement in these procedures:

. . . Administrative controls that make the best use of personnel available at the lowest cost.

. . . Selecting, training, and upgrad-

ing mechanics so they will "work smarter and not harder."

. . . Supplying tools and techniques that will make effective use of the skills developed by the mechanical force.

. . . Analyzing repairs and failures statistically to provide better basic information on improving preventive and corrective maintenance.

Du Pont has developed a system of statistical diagrams to show whether administration is effective, whether the work load is properly controlled in the plant, how much the program is costing, and what maintenance work is finally accomplished.

The company's method for acquiring skilled mechanical personnel differs today from what it was in the 1940's. Formerly Du Pont hired craftsmen with the highest skills; today it still tries to do that but, equally important, also seeks men able to absorb the company's specialized mechanical training.

Instruction on specific equipment, as well as basic fundamentals, takes from 120 to 1,000 hours for each mechanic, depending on the skills required.

Du Pont has found that men who know their job and have good morale are 12 per cent more effective and are subject to far fewer industrial accidents.

Tools for the job . . . Getting better tools and techniques for maintenance is an acute problem. Cost statistics prove it. Ten years ago the cost of labor amounted to 40 per cent of the total maintenance cost. Today it is 60 per cent and probably will rise to 70 per cent.

Putting it another way, York says that labor costs are greater for normal routine adjustments and inspections than the costly material replacements during emergency breakdowns.

In many cases, he says, the actual repair takes only 15 or 20 per cent of the total labor on a job. The other 80 or 85 per cent of the time is consumed in make ready, preparation, transportation, and cleanup.

To cut down these costs, plants should develop jigs and fixtures and new maintenance techniques, particularly for cleaning pipe and equipment, so that the labor force can be used economically. Ladder wagons may be justified to replace scaffolding erected and dismantled.

Use of ceramic and carbide tools will increase the machining rate over the grinding technique. This and other high-speed methods could raise the average machining rates twofold. Similarly, new welding techniques will improve fabrication of piping systems.

Processing briefs

When a white spot appears on the deep blue reactor vessels in Esso refineries, it spells trouble. Operators know the reactor is developing a hot spot and takes measures promptly to insure safe operating conditions. A new paint that changes from deep blue to white at 580° F. turns the trick. Materials experts of Esso Research & Engineering Co. developed the paint. It is produced by Resin Research Laboratories of Newark.

Humble Oil & Refining Co. has installed a giant electronic computer at its Baytown refinery. The machine, an IBM 705, will help determine optimum temperatures, flow rates, and other operating conditions. Humble's technical and research divisions also will use the computer for guidance in design of new operating units.

A new 1,500-bbl. U.O.P. Platforming unit is on stream at Premier Oil Refining Co.'s 4,000-bbl. refinery at Longview, Tex. The new unit operates with a Unifining unit. Procon, Inc., built the new Platformer, which is Premier's second. The company's first Platformer went on stream in 1951 at the firm's 7,900-bbl. Fort Worth plant.

Oil & Chemical Products, Inc., plans to combine reforming, solvent extraction, and isomerization in one package at a proposed Platformer-Udex-Pemex installation near Houston. The plant—the first of its kind—would process 5,000 bbl. per day of selected natural-gasoline feed stocks. The proposed $5-million plant will be located in the same general area as Oil & Chemical's benzene refining unit near Houston.

Sinclair Oil & Gas Co. will build a 36,000-gal. natural-gasoline plant in Lea County, N. M. The project includes a system for gathering wet gas and returning residue gas for lease operations during the early phase of operation. Completion is scheduled for the third quarter of 1958, but Sinclair plans to be recovering a raw unfractionated liquid hydrocarbon mixture by the first quarter. When all units go on stream, liquid products will be sold by tank truck and pipeline and treated residue gas will be sold to a gas pipeline.

A new Platformer and Unifiner are being installed at the 20,000-bbl. Farmers Union Central Exchange refinery at Laurel, Mont. Refinery Engineering Co. is contractor for the project, which is scheduled for completion next spring. The crude and vacuum units will be enlarged next year, and expansion of the fluid coking unit is planned sometime later.

Douglas Oil Co. of California is operating a new 1,300-bbl. Unifining unit at its 7,000-bbl. Bakersfield refinery. The new equipment, with rerun tower for added flexibility, was engineered and built by Macco Corp., Paramount, Calif.

American Oil Co.'s new 6,200-bbl. Ultraformer is on stream at the company's El Dorado, Ark., refinery. This is the second Ultraformer for the 43,000-bbl. plant, boosting Ultraforming capacity to 11,800 bbl. The refinery's first such unit—rated at 5,600 bbl.—went on stream in 1954.

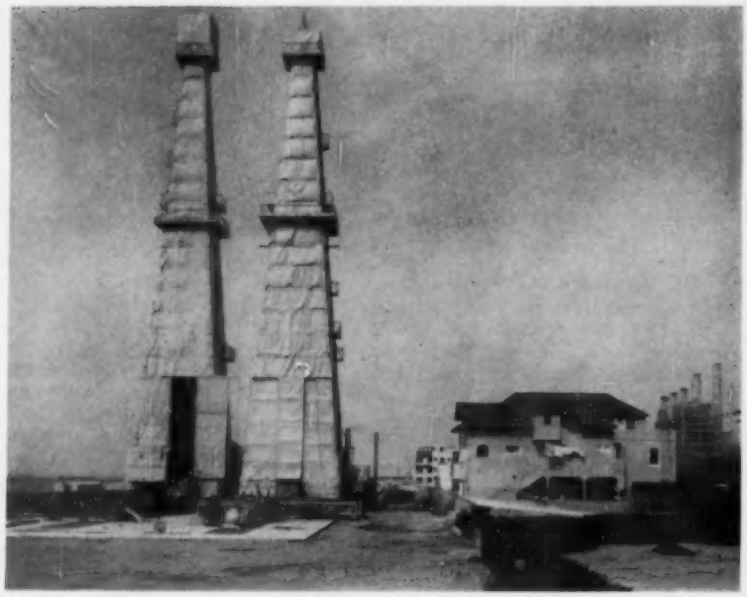
Bay Petroleum Corp., wholly owned subsidiary of Tennessee Gas Transmission Co., will install a 3,500-bbl. per day catalytic reforming unit at its Denver refinery. C. O. Garbrecht, vice president in charge of refining, said contract has been awarded to M. W. Kellogg Co. Work is scheduled to begin immediately. The Denver refinery has a daily crude-oil capacity of 10,000 bbl. The company also operates a 25,000-bbl. refinery near New Orleans.

Also for Refiners . . .

IN THE NEWS: Texas legislators propose to whip importers back into line (p. 64) . . . Strike at Imperial's Ioco plant may spread throughout British Columbia (p. 67) . . . Celanese researchers may develop tailor-made polymers (p. 69) . . . A.P.I. will honor Dr. Warren Lewis, pioneer researcher in petroleum (p. 70) . . . Inland refiners get break in bidding on military contracts (p. 70) . . . Du Pont fights rising maintenance costs with a new plan (p. 72) . . . Imports take their first drop under controls program (p. 76) . . . D-X Sunray opens new research lab at West Tulsa refinery (p. 81).

PLUS THESE TECHNICAL REPORTS: Details on Socony's eductor mixers which have been given to industry (p. 88) . . . One man crew can operate Northwest Branch cycling plant (p. 98) . . . Conoco's Short Junction plant in Oklahoma uses dual cycle which may highlight a small-field processing trend (p. 113) . . . Natural-gas dehydration at T.G.T.'s Gabe plant (p. 121).

Richfield is making part of its own rocks (left above) . . .



And Signal has built into the ocean as . . .

California Companies Use Do-It-Yourself Drill Sites

LOS ANGELES.—Southern California has two new man-made drilling sites that are attracting attention of the oil industry.

One is an island built offshore from Rincon, Ventura County, by Richfield Oil Corp., and the other is a mainland extension constructed by Signal Oil & Gas Co. off Redondo Beach in the bay of Santa Monica.

Signal's artificial drilling site now has two soundproofed rigs at work on wells whipstocked under the Pacific Ocean.

Before building the land extension, Signal used its adjacent onshore site to complete six offshore wells. The onshore site is a showpiece of southern California. The six wells have their wellhead equipment underground, and the area is landscaped.

The new drilling area is being completed in the same style. It parallels the mainland for 200 ft. and extends 120 ft. offshore. Before the rigs were moved in, conductor pipe was set for 24 wells, and there is sufficient room for 24 additional wells if future drilling is justified.

Another unusual drilling site is Richfield's piled-up piece of land still under construction, located one-half mile offshore from Rincon in 45 ft. of water.

When completed the island will have one acre of working area.

To anchor the huge rock used as preliminary fill, Richfield is using 32-ton tetrapods—four-pronged cement blocks. The tetrapods (white objects at left of top photo) are used where wave action is severe on the west side of the island. Their shape enables them to withstand pounding water better than granite boulders.

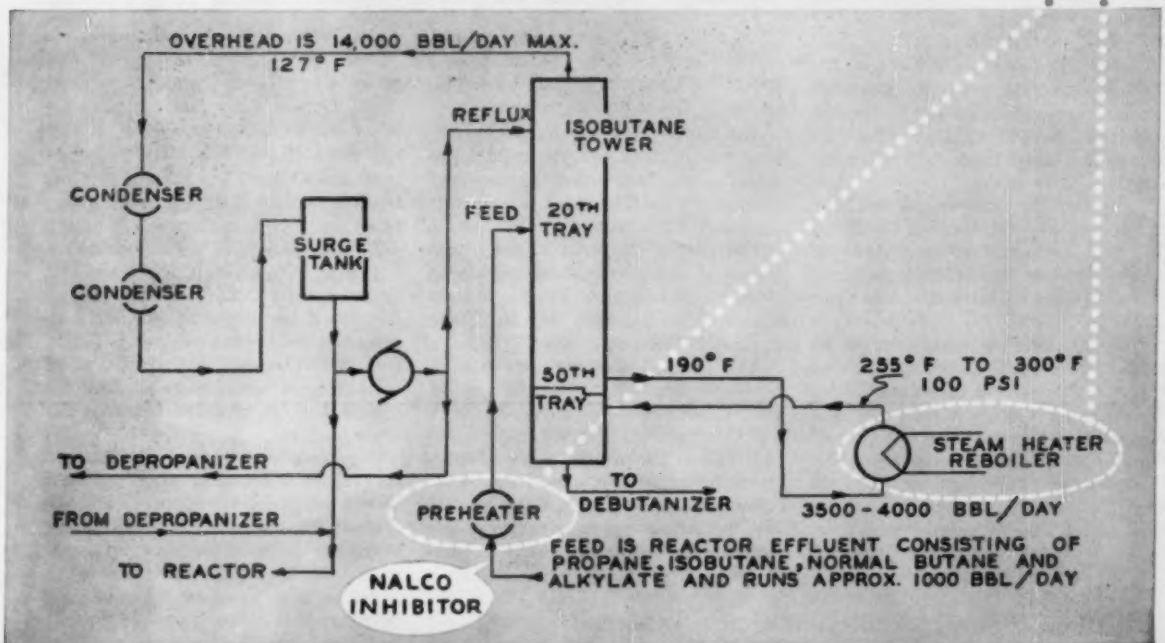
Richfield expects to finish the island next spring and start drilling late next summer. The company has a 1,175-acre offshore lease and can drill as many as 70 wells from the acre of working space on the island.

Eventually the island will be landscaped to conceal from the mainland all production equipment. It will have a small craft dock for use of the drilling crew and supply boats.

Richfield's original application for island-construction rights called for two islands—the second one to be located more than 1 mile from shore in 64 ft. of water. Success of the first island will determine whether the second is built.

Nalco INHIBITORS GET RESULTS AT THESE TYPICAL TROUBLE-SPOTS

IN AN H_2SO_4 ALKYLATION SYSTEM



THE PROBLEM	THE TREATMENT	THE RESULTS
1. *Corrosion* in the preheat exchanger of the isobutane tower. 2. *Fouling* with ferric sulfate and hydrolysis products of esters of H_2SO_4 in the reboiler of the isobutane tower.	Nalco Inhibitor fed to the isobutane tower at first month rate of 20 ppm with subsequent reduction to 10 ppm.	Reboiler pressure drop held to 25-28 psi. No decrease in reboiler coefficient. No problem of corrosion or deposits during more than a year of operation with Nalco treatment.

When corrosion and fouling start to limit refinery production, you can rely on fast, thorough Nalco chemical action to effect a cure.

The earlier the treatment, of course, the simpler the problem, so if you are beginning to detect corrosion and fouling, let your Nalco Representative help you *now* or write direct for further information.

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Imports Take First Drop

Flow of foreign oil slows down nearly to limits set by control program. But they'll jump again unless four importers comply with Carson's request to cut back

WASHINGTON.—The Government's new control program actually began slowing down imports for the first time in September.

Reports to Capt. M. V. Carson, administrator of the program, gave this picture: Actual imports for the month averaged 782,500 bbl. daily. That's an 84,300-bbl. drop from August's 966,800 bbl. daily figure.

Estimates for October and the four succeeding months, however, indicate that this low figure will not again be reached unless four companies comply with Carson's request to cut their imports.

Carson's monthly tabulation, to be released this week, shows that neither Eastern States, Northwestern, Ohio Standard nor Tidewater have cut their estimates in line with the rejection of their appeals for higher quotas.

The seven established importers, as a group, will get below their quota this month and continue at below-quota levels through next February, the latest month for which estimates have been filed.

Their February imports now are scheduled at 482,700 bbl. daily against a 493,100-bbl. quota. Their actual imports last month were 502,500 bbl. against 618,900 bbl. in August.

The quota for new importers has been raised from 267,500 to 273,300 bbl. Increases allowed two companies and quotas set for three newcomers account for the gain.

The latest tabulation shows that quotas of 3,200 bbl. daily have been given Bay Petroleum, 300 bbl. to Dow Chemical and 2,300 bbl. to Texas Asphalt & Refining.

The changes increase the total of allowable imports through the period ending next June 30 from the original figure of 755,700 bbl. to 766,400 bbl. daily. The estimates for February now are 807,500 bbl.

Officials said there is still a chance that the estimates will be scaled downward if the companies not now complying swing into line. The February figure includes Tidewater's original estimate of 62,500 bbl. daily, but the company is still reviewing its program.

A new policy . . . The Government meanwhile, has laid down a new rule involving refiners wanting to import foreign crude for the first time.

They have been informed their quotas will depend on how much domestic demand for crude increases.

First to feel the effects of this policy was Crown Central Petroleum Corp. Carson gave the company an allowance of 5,000 bbl. daily. It had requested 20,000 bbl. daily.

Crown Central has a legitimate interest in becoming an importer, Carson held. And under the provisions of the program it should be allowed to do so.

But at this point, Carson said: "I deem it infeasible to request all of the older importers to acquiesce in a further reduction of imports. Therefore, in my judgment, the element of increased domestic demand must be regarded as the decisive factor at the present time."

No significant change in domestic demand has occurred since the start of the program, the administrator admitted. But current estimates indicate a modest increase between now and next June 30.

"However," he added, "I must bear in mind that there may be requests by other companies, in addition to the petitioner, to enter the import field.

"A further consideration is that, in fairness, the older importers ought to be allowed to participate in increases in domestic demand."

The 5,000 bbl. allowed Crown Central, while only a fourth of the quota asked, will afford the company an opportunity to supply an appreciable portion of its East Coast demand with products derived from foreign crude, Carson ruled.

A provision in the program that newcomers must give 6 months advance notice of plans to import was, in effect, waived because Crown Central showed as early as last March that it intended to import. The company's allocation will go into effect immediately.

East-of-California Crude Imports

(Thousands of barrels daily)

	Actual Sept. 1957	Estimated Feb. 1958
Atlantic Refining Co.	66,900	53,900
Gulf Oil Corp.	93,700	104,000
Sinclair Refining Co.	49,900	62,500
Socony Mobil Oil Co.	79,000	67,100
Standard Oil Co. of California	84,000	61,100
Standard Oil Co. (N.J.)	79,000	72,000
The Texas Co.	50,000	62,100
Cities Service Co.	22,000	33,000
Eastern States Petroleum Co.	25,900	27,000
Gabriel Oil Co.	.....	12,900
Great Northern Oil Co.	28,600	33,000
International Refineries, Inc.	5,000	13,000
Lakehead Pipe Line Co.	200	300
Lake Superior Refining Co.	4,500	5,200
Northwestern Refining Co.	12,700	18,000
Phillips Petroleum Co.	18,800	12,000
Shell Oil Co.	.....	5,000
Standard Oil Co. (Ind.)	36,300	29,000
Standard Oil Co. (Ohio)	7,400	12,000
Sun Oil Co.	61,300	53,000
Tidewater Oil Co.	54,400	62,000
Southwestern Oil & Refining Co.	.....	.....
Bay Petroleum Co.	2,600	5,500
Dow Chemical Co.	300	400
Texas Asphalt & Refining Co.	.....	3,500
Total	782,500	807,500

Two Gasoline Plants Sold

SALE OF TWO Rocky Mountain natural-gasoline plants—one of them for dismantling—was announced last week.

Mid-States Pipe & Supply Co., Tulsa, purchased Continental Oil Co.'s idle plant at Lance Creek, Wyo., and prepared to liquidate and sell the

plant equipment and material. The plant was designed to process 25,000,000 cu. ft. of gas daily and is equipped with nine 300-hp. Ingersoll-Rand gas engine compressors.

A Colorado gasoline plant, owned by New Drilling Co., Denver, was sold to Hanover Corp., Denver. The plant has a capacity of 6,000,000 cu. ft. daily and currently is processing 3,000,000 cu. ft. daily from the Roggen and Kiowa fields.

Production consists of 3,000 bbl. of butane and about 2,500 bbl. each of propane and gasoline. Dry gas is sold to Colorado Interstate Gas Co.

U.O.P. Case Drags

Hearing to start this week may continue for months

NEW YORK.—Hearings on the terms of the proposed sale of Universal Oil Products Co. stock will begin Monday before Referee Louis M. Loeb. They may run for weeks or even months.

One thing to be established is whether or not the sale should be made and whether it would be in the public interest. Still another is the fee to be awarded Guaranty Trust Co. for acting as trustee.

At the conclusion of the hearings Loeb will report to New York Supreme Court Justice Jacob Markowitz, and the final outcome will not be known until Markowitz hands down his decision. It's conceivable that the matter may drag out to 2 years from the start of the proceedings in May 1956.

Principal accomplishment to date in almost 18 months is satisfaction of objections of the so-called intervenors. They wanted to be sure that U.O.P. services would be continued for at least 10 years, that ownership of the company would be widely held, and that certain persons be included on the board of directors.

Guaranty met these objections at a hearing before Referee Loeb July 11. On August 8 Loeb accepted the agreement in substance but told Guaranty that "the same end can be achieved by having the petitioner (Guaranty) amend its petition." Guaranty did amend its petition and Loeb received the amended version Friday, October 18. Last week he turned it over to Judge Markowitz.

Markowitz found that the amended petition was satisfactory in substance but he declined to accept it for technical reasons. These reasons are expected to be satisfied during the hearings beginning before Loeb this week.

Pipeline briefs

Sinclair Pipe Line Co. has called for bids on a 150-mile, 20-in. crude pipeline from Teague, Tex., to Houston. Bids are due next month. The contract will be let in late November or December, and construction is expected to start before the first of the year. The first phase of Sinclair's modernization program was completed last year when 152 miles of 18-in. was laid from Jacksboro to Teague, replacing old multiple 8-in. lines. The new line has capacity of 105,000 bbl. per day.

Toronto Pipeline Co., Dallas, plans to build a crude system to connect fields in Cheyenne, Morrill, and Banner counties, Nebraska, to Platte Pipe Line Co.'s 20-in. line from Wyoming to Wood River, Ill. Toronto will lay field lines and a 13-mile, 4-in. transmission line to Platte's Redding station.

Alberta Gas Trunk Line Co., Ltd., will operate the Alberta section of the proposed Alberta & Southern Transmission Co., Ltd., line to San Francisco, if it is built. Alberta Gas Trunk Line is the instrument set up by the provincial government to control export of gas. The company owns the system which supplies Trans-Canada Pipe Lines, Ltd., and expects to build the Alberta section of a Westcoast Transmission Co., Ltd., line from Savanna Creek to Pacific Northwest Pipeline Corp. at Kingsgate, B. C., on the Idaho border. Westcoast operates its own line from Peace River, however, under a permit predating Alberta Gas Trunk Line.

Georgia Pipeline Co., which is being acquired by Onega Corp., Uniontown, Pa., plans to build a 7-mile products pipeline from Savannah, Ga., to Hunter Air Force Base. Capacity will be 22,000 bbl. per day. The line is to be completed by December 31. Florida Pipeline & Storage Co., another Onega subsidiary, is building a 67-mile products line from Port Everglades, Fla., to Homestead Air Force Base.

The Texas Co. has started building a products terminal at Youngstown, Ohio, to distribute products received from Laurel Pipe Line Co.'s 14 to 24-in. line from Philadelphia to Cleveland. The terminal, to be finished next July, will have 3,066,000 gal. of storage. It will serve Youngstown and the nearby Pennsylvania area. Laurel Pipe Line, organized by Texaco, Gulf Refining Co., and Sinclair Pipe Line Co., will start construction early next year.

Great Lakes Pipe Line Co. expects to wind up its 93-mile, 8-in. products extension from St. Paul to Eau Claire, Wis., in about 2 weeks. R. H. Fulton & Co., Lubbock, Tex., has the contract on the job. The Eau Claire line is part of a general expansion of Great Lakes which also includes an extension to the Superior market.

Texas Eastern Transmission Corp. next month will complete the most extensive big-inch construction program in the industry this year. Contractors are in the final stages of tiein and cleanup work on most of the 667 miles of 30-in. between Kosciusko, Miss., and Uniontown, Pa.

Contractors on this program are H. C. Price Co., Williams Brothers Co., and Houston Contracting Co. Texas Eastern has laid more than 1,000 miles of 30-in. pipe during 1957, including a 422-mile extension from Beaumont to McAllen, Tex., on the Rio Grande to take gas from Mexico. Capacity was increased by 360,000,000 cu. ft. daily.

Williams Brothers Co., Tulsa pipeline engineering and construction firm, has become a publicly owned corporation. The company offered 300,000 shares of common stock, with par value of $1, at $11.50 a share last week.

Also for Pipeliners . . .

IN THE NEWS: Four Corners line goes piggy back over a bridge (p. 64) . . . Pipelines come under fire of sweeping Justice Department investigation and House subcommittee probe (p. 66) . . . Oil men want their planes of tomorrow faster, safer, and cheaper (p. 68) . . . T.G.T. expands reserves by buying Texas production (p. 69) . . . Canadian commission will investigate Trans-Canada's prices (p. 71) . . . Federal court and not FPC will decide legality of El Paso-Pacific Northwest merger (p. 78) . . . French are throwing men and money into temporary line to move Saharan oil (p. 87).

PLUS THESE TECHNICAL REPORTS: A simple, workable solution is found to safer loading-rack operations (p. 109) . . . Pipeline construction report (p. 139).

G.P.'s Oregon Wildcat Fails to Hit

THE LATEST EFFORT to put Oregon on the oil-producing states' map has failed.

General Petroleum Corp. was preparing to abandon 1 Long Bell, a 9,004-ft. wildcat in the Sulphur Springs-Siuslaw area of Douglas County, Oregon. The drill site is about 40 miles southwest of Eugene.

Operations on the wildcat were marred when Donald W. Green, co-partner in the drilling firm of Green & Heiser Drilling Co., Bakersfield, and Velton Walker, the tool pusher on the well, were killed in a plane crash while returning to California. Green's light plane plunged into the water at Coos Bay, Oregon.

Mecom May Sell Oil Holdings

HOUSTON.—American Petrofina, Inc., has been negotiating for the purchase of oil properties of John W. Mecom, Houston independent.

This was confirmed last week by spokesmen for both parties. The confirmation came by way of denial of published reports that a deal involving more than $200,000,000 had been consummated.

Harry A. Jackson, president of American Petrofina, emphatically denied rumors of the sale. He revealed, however, that the company had been negotiating with Mecom as well as other oil operators.

Mecom was not available for comment. A spokesman in his Houston office, confirming that there have been discussions with American Petrofina, indicated a sale was not imminent.

American Petrofina, an aggressive newcomer to the U. S. oil industry, is a subsidiary of the Belgian company, Cie. Financiere Belge des Petroles, S.A.

Moving into this country with the announced intention of acquiring integrated oil properties, the firm bought control of Panhandle Oil Corp. in 1956. Early this year it followed up with the purchase of about $35,000,000 worth of oil properties from American Liberty Oil Co., Dallas.

Mecom, one of the nation's leading independent oil operators, has extensive holdings in Texas, South Louisiana, and the Gulf of Mexico, in addition to exploration rights on large blocks of acreage in Haiti and Honduras. He also operates approximately 20 drilling rigs.

Mecom's oil production in Texas alone is estimated at about 8,000 bbl. a day.

He branched out into the oil-field equipment business in 1956 through purchase of Cardwell Manufacturing Co., Wichita, Kans.

Merger Case Heard

FPC eliminated in deciding legality of El Paso merger

WASHINGTON.—Legality of the El Paso Natural Gas-Pacific Northwest Pipeline merger will be decided in the federal courts rather than before the Federal Power Commission.

The Government last week won its first round in the fight. The federal District Court at Salt Lake City denied a motion by El Paso to transfer the issue to the FPC in Washington, Asst. Atty. Gen. Victor R. Hansen announced.

The court further refused to stay the case until an appeal could be taken and ordered the Government to go ahead with its suit, Hansen said.
No application for approval was filed with the FPC at the time on the ground that agency has no control

The merger took place last year. over mergers made by the purchase of stock unless there is a change of operating procedures or a transfer of facilities.

The Government did not move in until last July. Then it filed a suit to break the merger because it may substantially lessen competition or tend to create a monopoly (OGJ, July 29, p. 112).

El Paso then filed with the FPC in an effort to head off the court action. The commission last month accepted the application, but did not immediately set a date for hearings.

Eliminate *high-pressure surges...*
Fill *your casing automatically...and*
Circulate *at any time while running-in with*

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Now, not only can you fill casing automatically from the bottom while running-in, and protect low-pressure, permeable zones from damaging pressure surges – but you can also *circulate at any time.*

Baker "Circulating" FLEXIFLOW Fill-Up Collars feature a self-adjusting Flow Control Diaphragm that opens up (see Fig. 2) to relieve destructive pressure surges – as high as 5,000 psi – which tend to build up when casing equipped with conventional floating equipment is lowered in open hole. And then, when the rate of lowering is slowed down and pressure from below is reduced, this Flow Control Diaphragm closes down to prevent overfilling; see Fig. 3.

That's why Baker FLEXIFLOW Collars help prevent costly circulation losses . . . reduce mudding-off of producing zones . . . permit maximum recovery . . . and eliminate fracturing as a cause of primary cementing failure.

Surface filling is completely eliminated. Your casing fills *automatically* from the bottom *as it is run.* You can keep the casing moving, except for the short interval required to add and make up a joint.

In addition, you can *circulate at any time* while running-in. And a back-pressure valve can be brought into action for cementing by merely pumping a Bakelite Ball down the casing to the Collar; see Fig. 4.

Ask your Baker service engineer for more information about the successful Baker "Circulating" FLEXIFLOW Fill-Up Collar, and its companion, the Baker Model "E" Triplex Cementing Shoe, Product No. 136-E—a perfect-combination for many "problem" cementing jobs.

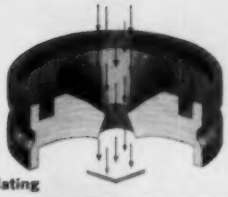

Fig. 1 — Circulating

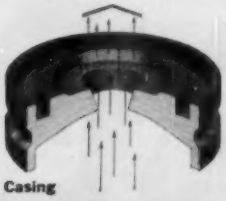

Fig. 2 — Filling Casing

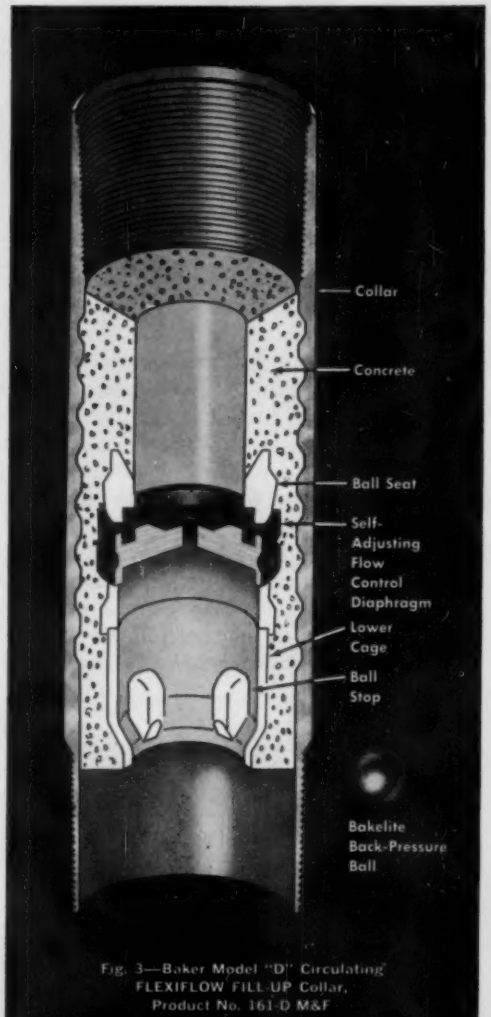

Fig. 3—Baker Model "D" Circulating FLEXIFLOW FILL-UP Collar, Product No. 161-D M&F

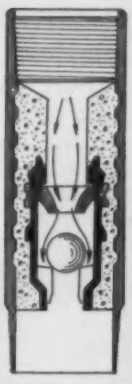

Fig. 4— Back-pressure ball dropped and pumped through hole in diaphragm.

Fig. 5— Ball in position to provide back-pressure valve.

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New Packing Method

. . . is paying off in California. It's fracturing with a twist, and it's kicking up output in problem oil fields

LOS ANGELES.—A modified hydraulic fracturing technique is giving new hope to producers in California oil fields where sand and silt create a problem.

Pressure packing, as the method has been labeled, is carried out much like a regular fracturing job. But by regulating the concentration of injected sand in the carrying fluid, the treatment not only fractures the formation but also forms a tight sand screen between the wall of the formation and the casing or liner.

Because California fields are geologically young, oil sands often are unconsolidated and easily crumbled. Sand and silt cause trouble because they are carried into the well bore by the moving oil and gas.

In the past, efforts to keep out the formation sand without damaging oil productivity have met with varying success. The difficulty lies in getting a proper compactness of injected sand so that it will protect the hole but not, at the same time, seal out the oil flow.

The results . . . In 92 per cent of some 150 California wells pressure packed so far, sand control was considered highly successful. In some wells production increased as much as 500 per cent. The average increase was around 250 per cent.

Fracturing was responsible for some of the increased oil output. But most of it came from the ability of the wells to stay on production for long periods with no down-time for clean-outs.

The first report of the new method's success was given by H. E. Rawlings, Jr., of Halliburton Oil Well Cementing Co., before the Southern California section of the A.I.M.E.'s Society of Petroleum Engineers.

He reported that the method has been particularly successful in Fruitvale and Raisin City fields, where it touched off new development programs.

At Raisin City the first 12 treatments resulted in a production increase from 800 bbl. daily to 2,000 bbl. for the wells involved. Some 40 wells have been pressure packed there so far.

In Mt. Poso field, pressure packing proved so successful, Rawlings said, that one operator ceased development drilling and started on a 125-well recompletion program. In the first 12 wells treated, sand control has been 100 per cent effective, and production increases have averaged more than 300 per cent.

The technique . . . The basic difference between pressure packing and conventional gravel packing is the dispersion of carrying-fluid into the formation. The procedure is much the same as a conventional cement squeeze job, except that higher pressures are used after the formation has broken down.

Far more types of wells can be treated with the pressure-packing method than with gravel packing. It has been successful in packing gun-perforated intervals behind cemented casing, long open-hole sections below casing, and combination strings of slotted or perforated liners below cemented casing.

The volume of sand used per treatment varies. Best results have been obtained where the injected volume ranges between 600 and 1,000 lb. of sand per foot of formation treated.

D-X SUNRAY President R. W. McDowell dedicates a new research plant in West Tulsa.

Two Research Labs Opened

THE OIL INDUSTRY will profit from processing research to be conducted in two new research centers dedicated near Tulsa and Kansas City.

D-X Sunray Oil Co. opened a million-dollar research plant at its 75,000-bbl. West Tulsa refinery. President R. W. McDowell said the expansion means improvements in gasolines, motor oils, and other petroleum products. The center was named for Harry T. Bennett, chief chemist and technical advisor, who has been associated with the refinery since 1920.

The other new research center was built by Spencer Chemical Co. 12 miles from downtown Kansas City in Johnson County, Kansas. The three-level structure has 27 laboratories and other facilities, including a separate process laboratory.

SPENCER CHEMICAL CO. recently completed a new lab near Kansas City.

Proration Irks Texas

Commission may reverse its policy of cutting allowables to satisfy independent producers and state government

DALLAS.—Crude buyers saw ominous signs last week that they may run into a tough, Oklahoma-style prorating policy in Texas.

The Texas Railroad Commission is growing increasingly irritable over the fact that prorating by purchasers still continues despite the commission's steady, deep whacking of producers' allowables.

The commission at its October 17 hearing settled on a 12-day allowable for November—holding to this all-time low figure for the second straight month. It represents a 50 per cent cut in the allowable since March. It was set at a time when seasonal demand normally turns up and when cuts in imports were expected to improve the domestic picture at least a little.

Despite the 12-day allowable for November, considerable purchaser proration appears certain in Texas next month.

Revenue crisis . . . Pressure for some kind of relief is building up from independent producers and from the state government itself, which depends heavily on oil revenue and now faces large deficits for the first time in many years.

And the Railroad Commission, feeling this pressure, is getting fed up.

Olin Culberson, one of the board's three members, has refused to vote for any allowable under 15 days. The allowable reached that level early last summer and has remained at or below it since.

Culberson's view may soon be the majority view on the commission. William J. Murray, Jr., who rounds out the board with Gen. E. O. Thompson, declared at the hearing: "If we can't, by cutting and cutting, maintain ratable take for all, then I guess maybe I'm ready to abandon this long-cherished principle and turn it over to the purchasers and let them decide whose oil to take."

"I'm not willing to go further with this cutting when it hasn't done the job. I'm serving notice that if this desperate cutting of allowables doesn't produce ratable taking, I'm willing to follow someone else's idea."

This statement is being taken to mean that he may vote with Culberson.

Further evidence of the change in Murray's attitude was furnished in a recent talk here before the Petroleum Engineer's Club. He said then the solution to Texas' problem may lie in the outcome of the Oklahoma Corporation Commission's order to force Gulf Oil Corp. to take the full allowable in Oklahoma.

ALLOWABLES BY DISTRICTS

District—	Nov.	Inc. from Oct. 5
1—Southwest Texas	60,930	865
2—Texas Gulf Coast	128,133	3,839
3—Texas Gulf Coast	426,785	8,195
4—Southwest Texas	208,353	4,005
5—East Central Texas	35,516	1,034
6—Outside East Texas field	124,476	3,446
6—East Texas field	166,912	4,975
7-B—North Cent. Texas	164,919	6,490
7-C—West Cent. Texas	160,843	4,731
8—West Texas	1,108,149	25,663
9—North Texas	283,579	4,671
10—Panhandle	130,332	3,644
Total	2,998,927	71,558

The contempt action, against Gulf, he said, is being watched closely by the Texas commission in the hope its outcome may give Texas a pattern for enforcing ratable purchases of crude oil. If Gulf is held guilty of contempt, it will appeal to the courts.

If Oklahoma wins, Murray said, "we probably will try the same course."

Humble hurting . . . Murray and his commission colleagues were perturbed by testimony from two sources during the Texas allowable hearing—one an independent producer, the other the largest crude buyer in Texas.

The buyer, Humble Oil & Refining Co., asked for a cut to 11 days for November. Humble said that in the past 30 days Gulf Coast refineries which it supplies with crude have cut their runs up to 50 per cent. This represents a market loss of 5,100,000 bbl. of crude which Humble had expected to deliver and sell the last 4 months of the year.

Furthermore, Humble said, the company can see no improvement in its market outlets. The big oil buyer said it had piled up more than 1,000,000 bbl. of oil as surplus storage. And it would have to add 800,000 bbl. to this surplus storage in November for each day in excess of an 11-day producing schedule.

A Gulf spokesman said Gulf is taking only 10 days output from non-exempt fields in Texas and the full allowable from the exempt fields—roughly 88 per cent of allowables state-wide.

Independents cut off . . . Independent C. W. Brown told the commission that operators in Brown & Thorpe Clearfork field in Pecos County, West Texas, have been cut off entirely by their oil buyer, Crown Central Petroleum Corp.

This occurred despite the fact that the producers built their own gathering system and pipeline and were delivering directly to the trunk line at McCamey, Tex.

Production from the field, Brown said, is about 1,300 bbl. daily. Crown Central, Brown said, hasn't been an importer but had applied for permission to import after serving notice on the Brown & Thorpe producers.

Brown said 77 wells in the field will have to be shut in November 1 as the situation now stands.

Stands firm . . . Another sign the commission attitude is stiffening against further cuts was its decision to increase the November calendar-day allowable slightly over the objections of Humble, Gulf, and other large purchasers.

The November allowable will go up some because the 12 producing days will be spread out over only 30 days as opposed to 31 for the same number of producing days in October. The calendar-day allowable for November thus will be 2,998,927 bbl., compared with 2,964,062 bbl. initially for October and the 2,927,369 bbl. figure in effect October 5. These are increases of 24,865 bbl. daily and 71,560 bbl. daily.

Interest Low at Texas Sale

AUSTIN.—The weakest bidding for state leases in several years featured the October 22 auction here of about 45,000 acres of University of Texas lands.

Average per-acre bid for the leases was only $60. This stacks up with an average bonus of about $112 per acre at the last auction in November 1956.

In all, the board received high bids totaling $2,712,500. Highest single bid was the $187,500 paid by R. E. Williams of Midland, Tex., for 320 acres in Crane County about ½ mile northeast of McElroy field. Humble Oil & Refining Co. ran a close second with a $185,000 bid for 162 acres in Andrews County ½ mile from Bakke field.

Humble submitted the top per-acre bid on this tract at $1,150.

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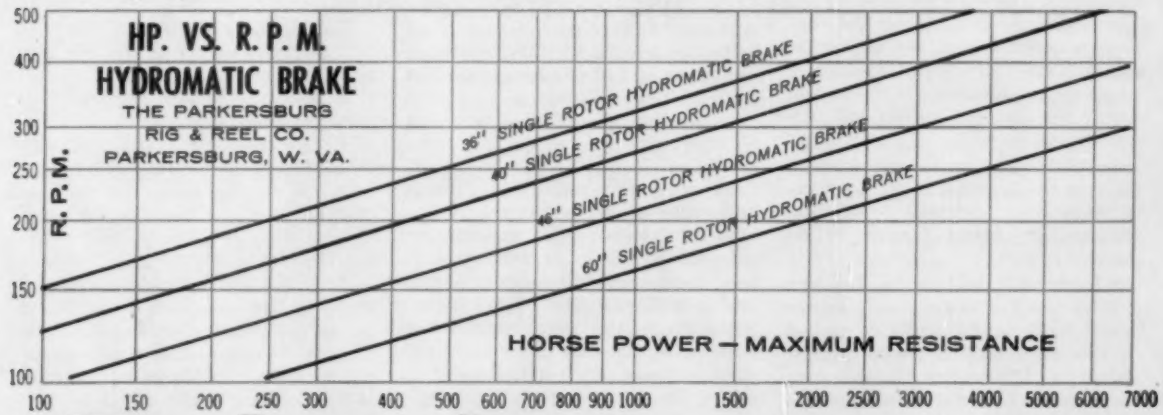
BRAKING POWER goes up, up, and up!

Drillers know that the braking power of a Hydromatic increases automatically with the speed of the drum. This means that the load on the drawworks is under complete control at all times.

The Hydromatic has still another advantage . . . it can never fail suddenly and completely. In case of outside reservoir or pump failure, a built-in reserve reservoir in the stator will enable the Hydromatic to keep the load under control until the mechanical brakes can be applied. No other drawworks brake offers this extra protection against runaway loads.

Specify a Parkersburg Hydromatic on your drawworks and make sure you're getting more and safer braking power.



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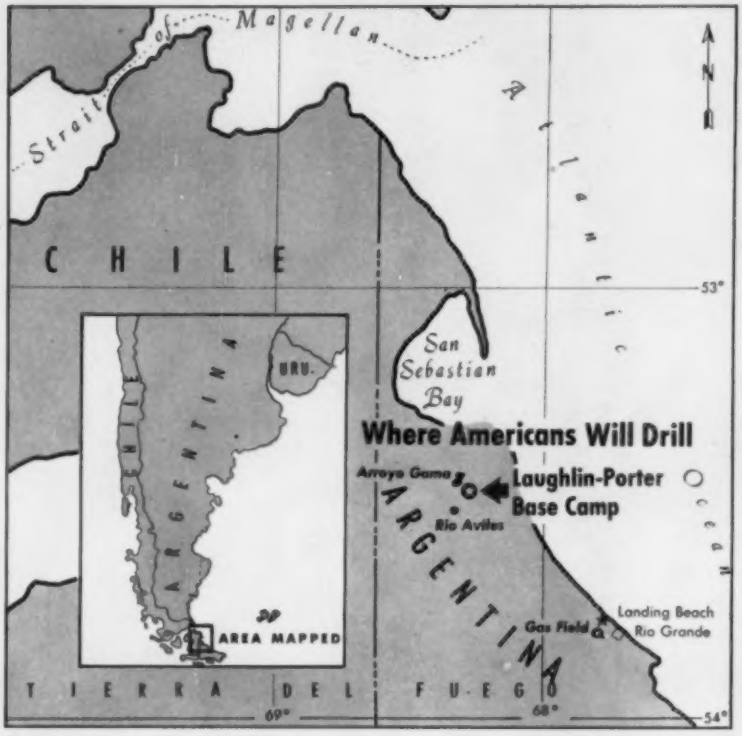
Texan Lands 40-Well Argentine Deal

- West Texas contractor will help Y.P.F. develop two fields on island south of Strait of Magellan
- A new outlook toward foreign participation may be in the making as result of the contract signed with Laughlin-Porter Drilling



A NORTH AMERICAN oil firm has broken the ice in Argentina.

Laughlin-Porter Drilling Co. of Midland, Tex., last week was awarded a $3,000,000 contract by the Argentine Government to drill 40 wells on Tierra del Fuego. This is the half-Argentine, half-Chilean island at the southern tip of South America.

The contract calls for a newly-formed Laughlin-Porter subsidiary; Laughlin-Porter Drilling Co. of South America, a Western Hemisphere corporation, to develop oil discoveries made on the island by Yacimientos Petroliferos Fiscales, the Argentine government oil agency.

Phillip E. Laughlin, Laughlin-Porter president, told the Journal last week the agreement was negotiated in the form of a straight footage contract. The contractor will furnish the rigs, supplies, drilling mud and chemicals, cement and cementing operations, labor, and supervision. Argentina will supply the pipe and logging and perforating services.

Laughlin, the first North American oil man to do business in Argentina in many years, estimates it will take the company about 2 years to do the job.

All 40 wells will be development drilling in Rio Aviles and Arroyo Gama fields in the northern portion of the island unless the two pools should be defined first. In this case, the remainder of the wells would go for exploration.

The contract contains a reimbursement or liquidated-cost clause for contractor protection if fewer than 40 wells are drilled.

January kick off . . . Laughlin-Porter plans to ship two 8,000-ft. rotaries and a small power completion unit to Buenos Aires in the near future in an effort to kick off drilling by about January.

The equipment will be transshipped at Buenos Aires to an Argentine Navy LST and landed on La Mission beach just north of Rio Grande on the east coast of Tierra del Fuego.

La Mission beach is the only spot on the eastern coast of the island that the heavy equipment can be landed. Lack of port facilities and extreme 30-ft. tides eliminated other areas.

Tierra del Fuego is a mountainous province of about 27,600 sq. miles lying south across the Strait of Magellan from the mainland. There are no paved roads, but the dirt roads are built up so that they drain easily and stay in reasonably good shape even during the rainy season.

The island lies between the fifty-third and fifty-fourth parallels south. Winter is over and the spring rainy season is waning. Weather conditions will be roughly equivalent to those in May or June in the U. S. when drilling begins in January. Temperatures during the winter are relatively mild for an area so close to the south pole. The temperature seldom falls much below 15° F. The rigs, however, will be winterized for year-round drilling.

Laughlin-Porter will take along its own trucks to move the rigs and will set up a base camp at Arroyo Gama. It is about a 30-mile overland trip from the landing beach.

Arroyo Gama field, with only two producing wells, is about equidistant from the Chilean border on the west and the Atlantic on the east and roughly 8 miles south of San Sebastian Bay. Rio Aviles, with just one well, is about 6 miles further south. These are the only wells on the island except for a shutin gas well near Rio Grande. Development drilling by Y.P.F. since this discovery indicates it is a one-well field.

Production from the Argentine portion of the island is at present shut in. Across the border, however, an active Chilean drilling campaign has boosted oil output there to about 12,600 bbl. daily in just 9 years.

The two Argentine oil fields, Arroyo

Gama and Rio Aviles, are roughly in the center of a 20-mile-wide by 40-mile-long area which Laughlin says is potentially productive. The area is limited on the west by the southern end of the Andes Mountain chain and on the east by the Atlantic. Y.P.F. now has two rigs active in the area.

Discoveries to date have proved to be "very fine Cretaceous production" from about 7,000 to 8,000 ft., Laughlin says.

An opportunity . . . Laughlin-Porter was one of eight firms to respond to Argentina's public invitation to foreign drilling firms to bid on the contract.

Young Laughlin, who is 36, made two trips to Argentina to flange up the deal. Negotiations began last April.

Laughlin regards the newly negotiated contract as an opportunity to do other things in Argentina as well as make money. A good job by Laughlin-Porter for the Argentines could well open wide the country's door to U.S. oilmen.

There would be, he thinks, other such deals made. And Laughlin-Porter would be in a good position to bid for them.

Barinas Test Slated

Atlantic planning first well on 10,800-acre concession

THE FIRST TEST on a new 10,800-acre concession in Venezuela's Barinas area will be spudded in shortly after the first of the year.

Reading & Bates, Inc., Tulsa contractor, will drill the 10,000-ft. well for Venezuela-Atlantic Refining Co., which operates the block for a three-company combine including Sun Oil Co. and Pan Venezuelan Oil Co.

The three companies acquired the concession (Block 11) earlier this year. The acreage is just west of production owned by Socony Mobil Oil Co. de Venezuela and Sinclair Oil & Refining Co. at San Silvestre pool.

Reading & Bates has formed a new subsidiary, Reading & Bates Co. de Venezuela, to handle the contract. It will be the contractor's first operation in Latin America. A National 110 rig is being shipped to Barinas for the job.

Reading & Bates' new subsidiary is headed by J. W. Bates, Jr., president. C. E. Thornton is vice president, and J. W. Bates, Sr., is secretary-treasurer. Drilling superintendent is L. S. Mason.

Saudi "Marginal" Area Pays Off

ARABIAN AMERICAN Oil Co., which holds its spot as the world's second-ranking oil producer with practically no effort, has extended its productive area in Saudi Arabia a full 75 miles to the west.

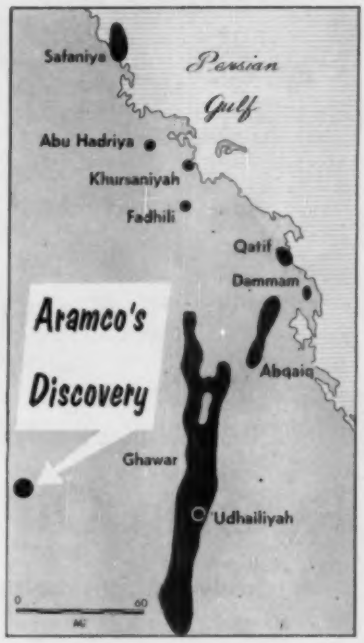
Aramco's latest wildcat "stepout," Khurais 1, is a producer. The test is 150 miles southwest of Dhahran, company headquarters. It is about 75 miles west of the mammoth Ghawar producing trend.

The wildcat is in the Dahana, a shifting belt of sand dunes which Aramco calls "active" in an area just east of Saudi Arabia's central plateau. It is in a region which the company had long conceded to be marginal in its vast concession area.

In spite of this marginal tag the company moved in the heavy rig which had drilled a 14,875-ft. dry hole deep in the Rub-al-Khali Desert area and started making hole on a structure located by gravity meter and structure drill crews. That was August 2. The company estimated it would take 6 months and more than a million dollars to complete the well.

Last week—more than 3 months ahead of schedule—Aramco knew it had a producer. On drill-stem tests of the "D" member of the prolific Arab zone, the well tested 3,000 bbl. daily of 31°-gravity sour crude. The tests were made from 4,755 to 4,898 ft.

The "D" member of the Arab zone is Saudi Arabia's most prolific producer. Most of the country's more than 200 wells produce from this zone. The productive rate of the new test is somewhat lower than the country's average of more than 5,000 bbl. per day per well. But a rank wildcat which produces 3,000 bbl. daily is hardly to be ignored, even in the Middle East.



Drilling in Greece hits a snag:

New York Enjoins Stock Sale

THE STATE of New York moved last week against a former shoe clerk from St. Louis who wanted to become a foreign-operating oil man.

New York prohibited him from promoting his oil stock.

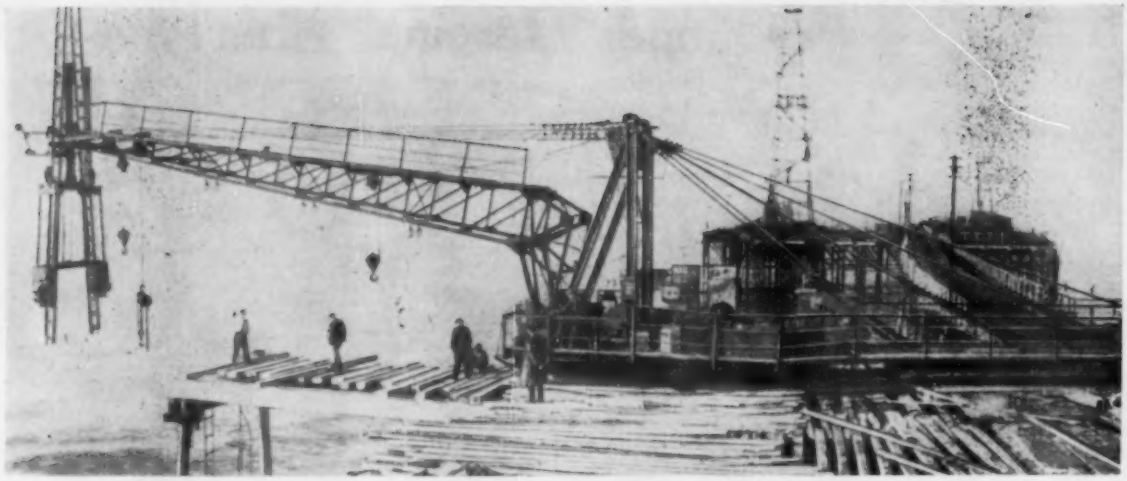
The New York Supreme Court granted New York Atty. Gen. Louis J. Lefkowitz an order which prevents American Grecian Oil Co. and its 26-year-old president, Martin Lerman, from doing business in New York.

Lefkowitz to'd the court Lerman had promoted $110,000 from the New York investing public in an "intensive stock promotion." Lerman told The Oil and Gas Journal in November 1955, that he did not plan to sell stock in his venture aimed at finding oil on the Greek island of Zante (also known as Zakynthos).

Lerman's operation got its start in late 1955 when the youthful St. Louis man got a concession for the island from the Greek Government and four private landowners. He knew nothing about the oil business, but he founded an oil company with himself as president.

A year passed before he made a deal to get things moving. He made a deal with Israel Mediterranean Petroleum, Inc., and Pan-Israel Oil Co. to take over his concession as the operators. The two Panamanian companies agreed to spend $150,000 and drill 15,000 ft. of hole on the island within 3 years for a half interest in the project (OGJ, Mar. 11, p. 114).

Two months ago, the two companies had had enough. After drilling only 7,000 ft. of hole on Zante, the two pulled out of the deal (OGJ, Sept. 23, p. 89).



Drilling trestles bridge Caspian reefs at Neftyaniye Kamny as. . .

Russian Oil Men Look to Baku Again

● Costly wildcat program is paying off. Geologists say offshore area has the brightest future, but deep onshore play also looks promising. It could mean new source of high-gravity crude for Soviet export market.

RUSSIAN oil men say there's still plenty of oil and gas to be found in the old Baku producing area in the Soviet's southern orbit.

After 2 years of intense exploration along the Caspian Sea Coast, some geologists are pooh-poohing a popular theory that the oil reserves in the Baku area are "exhausted."

In fact, they predict there's a good chance of stepping up the current output to 300,000 bbl. daily—if proper development methods are used.

One big reason behind the costly exploratory campaign is the export angle. Baku is a main source of export oil. It goes by pipeline and rail 450 miles westward across the Caucasus Mountains to the Black Sea port of Batumi, and on to foreign customers.

In its heyday, Baku provided more than half of the U.S.S.R.'s oil supply. Production at Baku reached a peak of 440,000 bbl. per day in 1940. But, with the Russians concentrating on the more pressing German offensive during World War II, production began to slip.

A new survey, published in the official Soviet magazine, Neftyanoye Khoziaistvo, says there is great hope for:

. . . More offshore oil production along the coast from the Apsheron Peninsula to the Iranian border.

. . . A new deep play for oil and gas in the old fields on the peninsula and the Kura River lowlands.

Offshore development . . . The Soviet magazine says the future is brightest in the island-studded area off the Apsheron Peninsula. Production from offshore fields has more than tripled between 1947 and 1955. Today, they account for 30 per cent of the total daily output of 300,000 bbl. in the Soviet republic of Azerbaijan.

Recent discoveries off the Apsheron Peninsula include:

. . . "Mud Mound" field, prolific pool between the islands of Zhiloi and Neftyaniye Kamny (Oil Rocks). Oil Rocks is the name of the reefs over which an intricate web of trestles and platforms has been built on steel pilings over water and low reefs (see photo above).

. . . New producing zones on the northeast side of the Neftyaniye Kamny fold, and near or on the islands of Peschany and Zhiloi.

. . . Promising anticline structures east of Artema Island in water 100 to 130 ft. deep.

And, on the extreme tip of the peninsula, the Russians are eying a large fold south of Shakhova Kosa.

The peninsula offshore area is only a part of Russia's hopes for underwater production. South of this area the Russians say the coastal strip from Apsheron to Lenkoran has great possibilities. Lenkoran is just 20 miles from the Iranian border.

This offshore stretch is an extension of the oil-producing Kobystan and Kura River lowlands. So far, there has been little exploration, with no reports of commercial production. But geologists think it looks good, so they're recommending a large-scale wildcat program.

Onshore . . . The Kura River lowlands are ranked second by the Soviets in oil potential in Azerbaijan. Some Russian oil men predict this region may become an important new oil center by 1960.

Most of the output comes from a northwest - southeast anticline near Ali-Bairamly. Large-scale deep wild-

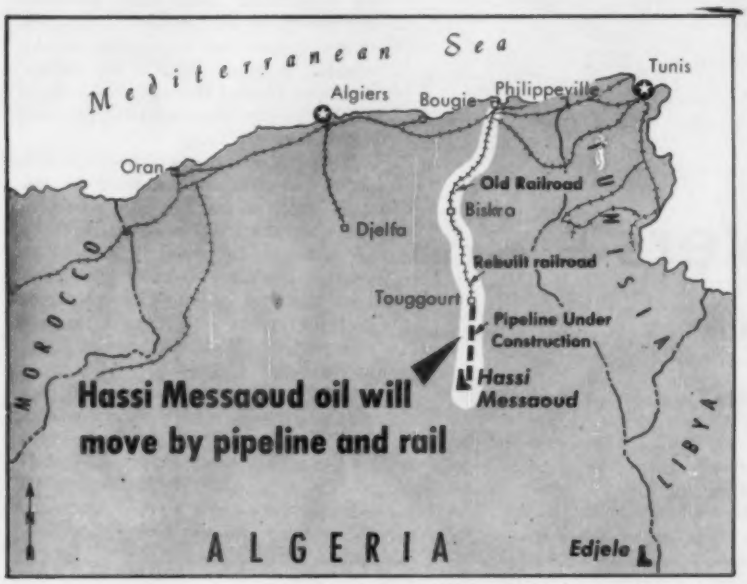
catting began in 1954. By early 1955, commercial production was found in the Apsheron formation.

The Soviets frankly admit that old fields on the peninsula itself are being depleted. But there is optimism about finding new oil and gas reserves below 9,800 ft.

They've drilled deep and turned up at least two major fields in the past several years. Karadag field, on the southwest flank of the peninsula, is already a big factor in Russian plans to boost Azerbaijan's annual gas production from 76,000,000 M.c.f. in 1956 to 176,600,000 M.c.f. by 1960.

The outer deep field is Zyrya, discovered on the southeastern part of the peninsula in 1954. The discovery well tested from 219 to 365 bbl. of oil daily from pay at 15,252-15,317 ft. This set off extensive exploration in the Kala-Zyr basin.

Russia's search for new production at Baku has cost a lot of money, and will probably cost a lot more. But the magazine pointed out that Baku's crude is exceptionally high quality which may help make up for the expensive campaign.



French Finance Temporary Line

. . . to get Algerian oil to Mediterranean. Work speeded up on small pipeline, and a narrow gage railroad is rebuilt

THE FRENCH are banking strongly on at least 4,000 bbl. daily of Saharan oil reaching the North African coast of the Mediterranean by the first of the year.

This output should double shortly afterward.

To achieve this goal the French are literally tossing almost $3 million into the political hopper. They can't hope to recover the money through normal amortization of a pipeline such as they are building.

But the political gains to be scored by getting this Saharan oil to a shipping point far outweigh the economic pitfalls, as far as the French are concerned.

Here's what is involved:

. . . **A 105-mile, 6-in.** crude-oil pipeline from Hassi Messaoud wells to the newly extended railhead at Touggourt (see map). The pipeline is being laid just as fast as pipe can be welded. It is not being cathodically protected, in fact, it is not even being wrapped.

. . . **Two pump stations** are being built along the line. The first station is expected to move 4,000 bbl. daily through the small-diameter line. When the second is added, the throughput will be at least 8,000 bbl. daily, possibly 8,500 bbl.

. . . **All this** is costing 1,200,000,000 francs (about $2,857,000) which the French are prepared to write off in less than 3 years.

The 6-in. line, frankly regarded as only a temporary expedient by the French, will eventually be replaced by a 24-in. pipeline from Hassi Messaoud to the coast. This will be in 1960.

Pipeline construction . . . Two spreads were at work last week on the small-diameter line. One was moving south from Touggourt and the other north from Hassi Messaoud. They hope to meet just before Christmas at Square Bresson, a small oasis about halfway between the two points.

At the end of last week more than 10 miles of pipe already had been welded by the north spread, and pipe was being strung on the south spread.

The big difficulty so far is the region's sand storms. Ditching crews must work almost immediately ahead of the welders. Otherwise sand fills the ditches before pipe can be lowered.

The railroad . . . In addition to the pipeline construction, the French are converting to standard-gage rails the narrow-gage railroad that once linked the 135-mile gap between Biskra and Touggourt.

The real problem posed by the plans for this somewhat modest pipeline throughput is not in the pipeline capacity itself. The problem still lies with the railroad. In spite of the railroad extension, the steel rails themselves will be a bottleneck as far as crude movement is concerned.

Algerian sources put the top capacity of a train of tank cars on the railroad at 2,800 bbl. daily. There is extreme doubt that the French can move more than one train a day from Touggourt to the coast.

Because of the railroad vulnerability to nationalist sabotage, it is virtually impossible to move trains through the Atlas Mountain passes at night. If the vitally needed oil is being hauled on the railroad, this threat will certainly be doubled.

So, even if the two pump stations planned for the line can move as much as 8,500 bbl. daily to Touggourt, the big problem will still be getting the oil—at a top of 3,000 bbl. per trainload—over the 340 miles of vulnerable rail lines to the coast.

Refinery Plans Firmed

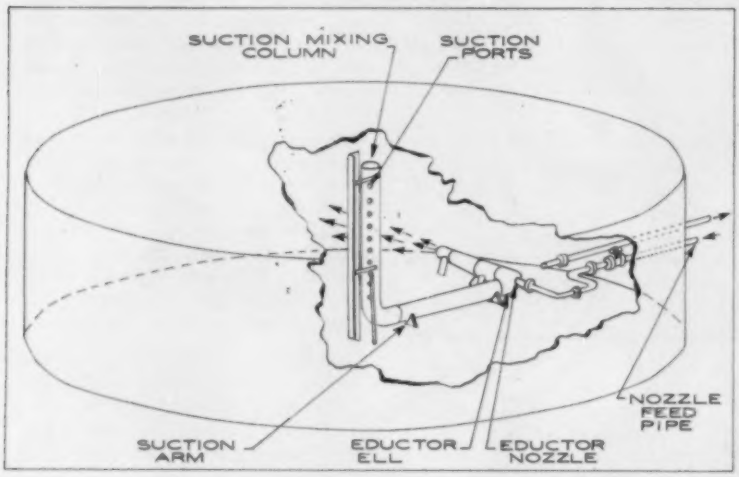
The 40,000-bbl. refinery which Standard Oil Co. (N. J.) has long planned for Norway will be owned and operated by a wholly owned Jersey company called A/S Esso-Raffinerie, Norge.

Jersey Standard said last week that construction of the $30-million refinery will begin next year in a still-to-be decided location on the east side of Oslo Fjord in southern Norway.

It will operate on Middle East crudes and will furnish all major product requirements for Norske Esso, the Jersey marketing company in Norway.

Here are the design details of Socony

By Robert B. Meny
and
Robert B. Velykis
Socony Mobil Oil Co., Inc.



TYPICAL EDUCTOR MIXER and its arrangement in a fixed-roof tank. Fig. 1.

Eductor mixers for mixing liquids in fixed-roof tanks

EDUCTOR MIXERS have produced a record of satisfactory performance. The mixer design is sound, as shown by the good mixing results which have been obtained. The applications of these mixers include the mixing and blending of chemicals, crude, asphalt, acid sludge, fuel oil, gasoline, and cracking charge stocks.

A typical eductor mixer and its arrangement in a fixed-roof tank is shown in Fig. 1. Details of the suction mixing device are shown in Fig. 2. The mixer functions as follows:

Liquid is pumped through the eductor nozzle. Because of decreased static pressure at the point where the nozzle enters the eductor ell, several times the volume of liquid being pumped, depending on the physical properties of the system and dimensions of the eductor, is drawn through the suction tube and ejected through the eductor discharge tube along with the pumped liquid into the tank.

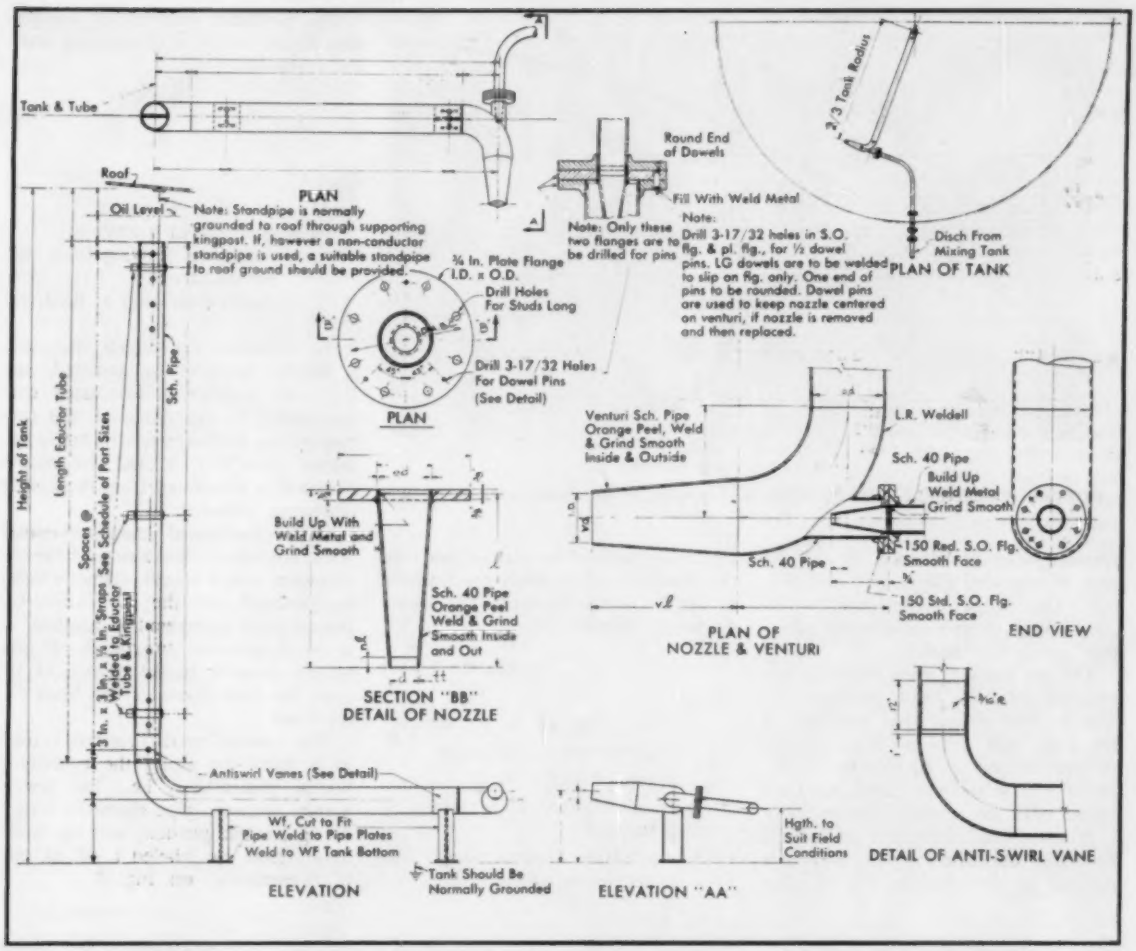
The suction tube is connected to a perforated vertical standpipe in the tank center so that the educted liquid is drawn from all levels in the tank to promote thorough mixing. The eductor discharge tube is located to eject horizontally and tangentially to the tank radius so that some rotation is imparted to the entire body of liquid in the tank.

Ability of the suction mixing device to promote a high eduction ratio, which is the key to the effectiveness of the eduction mixer, is due mainly to the fact that the motivating jet is working against a very low head by ejecting into the tank. Thus most

Socony Mobil dedicates patent to public

About 15 years ago the Paulsboro refinery of Socony Mobil Oil Co., Inc. (then Socony-Vacuum Oil Co.), developed and patented a simple and effective device for mixing crudes in fixed-roof tanks. This device was called an eductor mixer because the motivating force for mixing was provided by liquid entering the tank into a submerged suction mixing device with appropriate auxiliary connections. When satisfactory mixing was obtained by the filling operation alone without recourse to recirculation of the tank contents, the device was judged successful. Mixers using the same fundamental arrangement were designed for other tank-mixing services, and licenses were made available to industry[1] on a fixed-fee schedule under the assigned patent rights (U. S. Letters Patent No. 2322087).

Socony Mobil has decided to release outright its engineering know-how on eductor mixers and dedicate its patent to the public as a service to industry. A dedication of the terminal part of the patent term has been filed in the United States Patent Office. This article has been prepared to present the basic engineering information and procedure that has been used to design these mixers. Application of the principles contained herein should enable any prospective user to design an eductor mixer for a particular service with a standard of performance at least equal to that of previous mixer designs. With publication of this article, the information contained herein is considered to be a free art. Any future requests to Socony Mobil Oil Co. for eductor mixer designs will be referred to this article.


Tank & Tube
Roof
Oil Level
PLAN
Note: Standpipe is normally grounded to roof through supporting kingpost. If, however a non-conductor standpipe is used, a suitable standpipe to roof ground should be provided.
Height of Tank
Length Eductor Tube
Sch. Pipe
Spaces @
3 In. x 3 In. x ¼ In. Straps See Schedule of Port Sizes Welded to Eductor Tube & Kingpost
Antiswirl Vanes (See Detail)
Wf. Cut to Fit Pipe Weld to Pipe Plates Weld to WF Tank Bottom
Tank Should Be Normally Grounded
ELEVATION
¾ In. Plate Flange I.D. x O.D.
Drill Holes For Studs Long
Drill 3-17/32 Holes For Dowel Pins (See Detail)
PLAN
Round End of Dowels
Fill With Weld Metal
Note: Only these two flanges are to be drilled for pins
Note: Drill 3-17/32 holes in S.O. flg. & pl. flg., for ½ dowel pins. LG dowels are to be welded to slip on flg. only. One end of pins to be rounded. Dowel pins are used to keep nozzle centered on venturi, if nozzle is removed and then replaced.
2/3 Tank Radius
Disch From Mixing Tank
PLAN OF TANK
Build Up With Weld Metal and Grind Smooth
Sch. 40 Pipe Orange Peel Weld & Grind Smooth Inside and Out
SECTION "BB" DETAIL OF NOZZLE
Venturi Sch. Pipe Orange Peel, Weld & Grind Smooth Inside & Outside
L.R. Weldell
Sch. 40 Pipe
Build Up Weld Metal Grind Smooth
150 Red. S.O. Flg. Smooth Face
Sch. 40 Pipe
150 Std. S.O. Flg. Smooth Face
PLAN OF NOZZLE & VENTURI
END VIEW
Hgth. to Suit Field Conditions
ELEVATION "AA"
DETAIL OF ANTI-SWIRL VANE

STANDARDIZED WORKING DRAWING shows the essential details for a typical eductor mixer design. Fig. 2.

of the inlet head can be applied to increase eduction ratio rather than maintain downstream pressure, and lower pump-size requirements are needed.

In most cases continuous mixing of tank contents can be carried out while filling. In these instances it is usual to design for an eduction ratio of about 5:1. A pumping head of between 10 and 30 psig. above tank head plus system friction loss is sufficient to achieve these ratios using the eductor mixer design.

In special cases, i.e., when blending to specification, more extreme prolonged mixing can be obtained by circulating a drag stream from the tank. Eduction ratios of about 10:1 can be used in these instances in order to shorten the extra mixing time.

Design Procedure

This design procedure is for application in fixed-roof tanks. A number of schemes for application in floating-roof tanks have been suggested, but no commercial designs have been made. One idea which has been proposed by R. B. Velykis utilizes a protective vapor-tight sheath, which is an integral part of the roof, to fit over the vertical suction tube. This sheath is installed with suitable internal guides so that the roof may change its position without interfering with the fixed position or the performance of the suction tube.

The following information should be available prior to designing an eductor mixer:

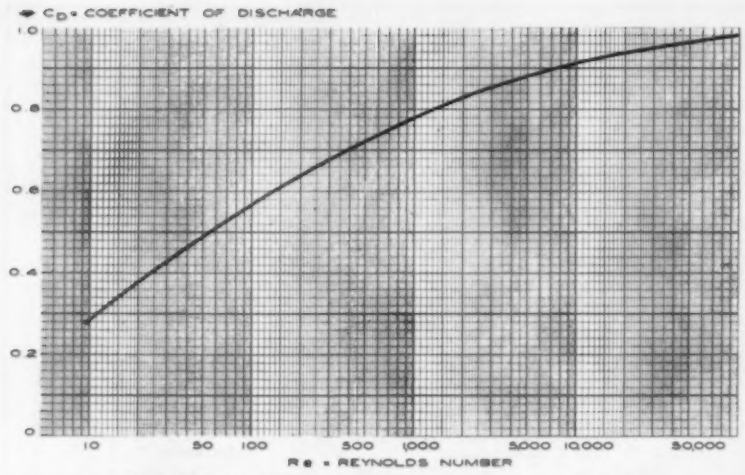
1. Height and diameter of tank.
2. Location of internal roof-support columns.
3. Size and location of steam coil (if present).
4. Specific gravity of components.
5. Viscosity of components.
6. Relative quantity of components.
7. Temperature of individual components.
8. Net pressure available on filling line at tank (minus tank head).
9. Pumping rate.
10. Blending time required.

Working drawing . . . A standardized working drawing is shown as Fig. 2 containing the essential details for a typical eductor mixer design. It shows the general arrangement of the assembly in a tank, support details for the suction arm and suction tube, electrical grounding information, eductor nozzle details, and the plan of nozzle and venturi. This is a working drawing and dimensions are to be fitted in depending on the requirements of a specific design.

Critical flow areas and other dimensions which bear a relationship to one another, have been labeled with appropriate letters to identify them in the following design steps. Other dimensions have been left blank since they depend on tank dimensions and other features of the system being designed.

Basic Design Steps

1. Eductor nozzle design . . . The eductor nozzle is sized to give a net



NOZZLE DISCHARGE COEFFICIENT is a function of Reynolds number. Fig. 3.

pressure drop of between 10 and 30 psig. at expected filling or circulating rate. This range is considered sufficiently high to give satisfactory eduction ratios for mixing.

The net pressure drop refers to the absolute loss in head through the nozzle. This means that pressure at the tank inlet must be high enough to provide for a 10-30-psig. nozzle pressure drop and also counteract tank liquid head and piping friction loss.

A standard correlation of nozzle discharge coefficient versus Reynolds number is presented in Fig. 3. This chart may be used in conjunction with the standard nozzle discharge formula to size the nozzle diameter. The nozzle discharge formula is:

$$q = C_D A (2gh)^{1/2} \qquad (1)$$

where:

- q = discharge, cu. ft. per second
- C_D = coefficient of discharge
- A = area of nozzle, sq. ft.
- g = acceleration of gravity, 32 ft./sec.^{2}
- h = available head at nozzle, i.e., net nozzle pressure drop, ft.

The Reynolds number for application to the above is determined from the formula:

$$Re = \frac{50.7\, Q\, \rho}{d\, \mu} \qquad (2)$$

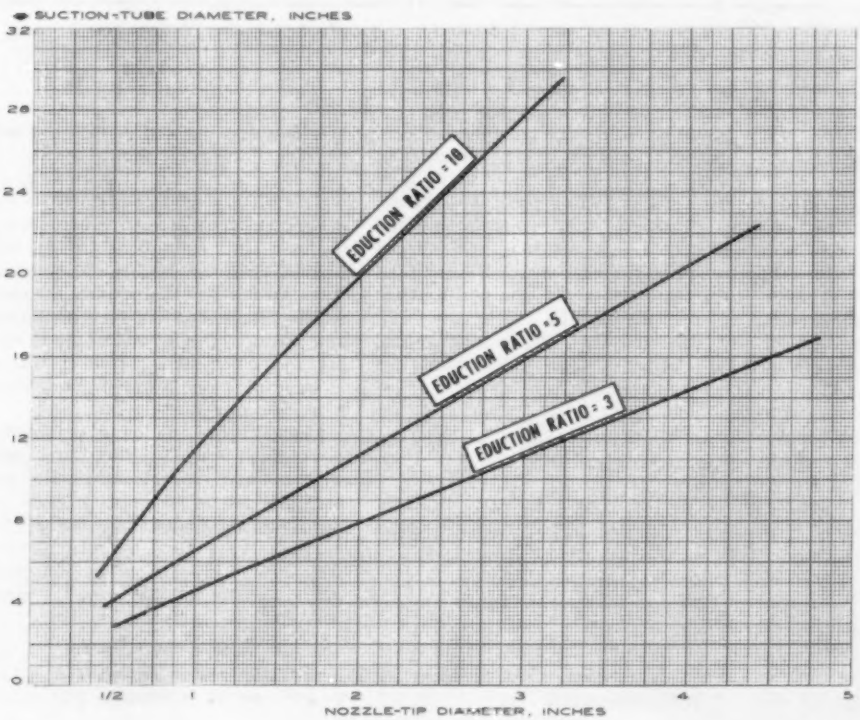
where:

- Q = rate of flow, g.p.m.
- d = diameter of nozzle, in.
- ρ = density of flowing fluid, lb. per cu. ft.
- μ = absolute viscosity of fluid, cp.

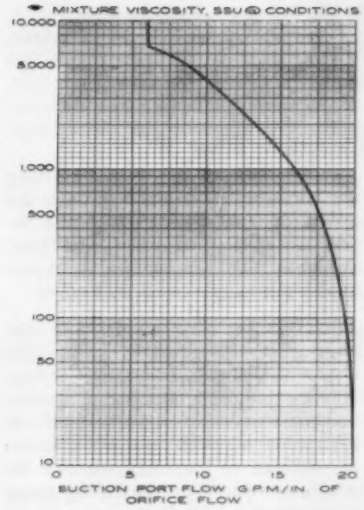
To calculate the nozzle diameter, a nozzle diameter is assumed, the Reynolds number is calculated corresponding to this diameter, the corresponding discharge coefficient is obtained from Fig. 3, and the nozzle diameter is calculated from the nozzle discharge formula.

If the calculated nozzle diameter does not check the assumed nozzle diameter, a new nozzle diameter must be assumed and the calculation repeated until agreement is reached. It is usual practice to round off the nozzle diameter to the nearest ⅛ in. once the true diameter has been determined.

The internal nozzle diameter is used as a basis for sizing the remaining nozzle dimensions, i.e., the nozzle length, entrance pipe diameter, length of tip straight portion, and tip thickness. These are labeled l, ed, nl, and tt, respectively, on Fig. 2.



SUCTION-TUBE DIAMETER is determined from nozzle-tip diameter, after the eduction ratio has been set. Fig. 4.



PORT VELOCITY of suction port depends on average viscosity of the mixed system. Fig. 5.

The nozzle dimensions bear the following relationship to the internal nozzle diameter, dimension d on Fig. 2:

$$l = 6d \quad (3)$$

$$ed = > 2d \text{ and } < 3d \quad (4)$$

$$nl = 1/2\,d \quad (5)$$

$$tt = 1/50\,d \quad (6)$$

2. Selection of eduction ratio . . . The eduction ratio is the ratio of the liquid educted from the tank to the quantity of liquid passing through the eductor nozzle. The ratio is a function of both the nozzle pressure drop and the properties of the stock being mixed. However, the eductor mixer design is based on using a relatively constant nozzle pressure drop in the 10-30-psig. range. Thus the effect of nozzle pressure drop on eduction ratio is eliminated as a variable, and the ratio becomes principally a function of gravity and viscosity of the stock being mixed.

A satisfactory eduction ratio for the eductor mixer design at a nozzle pressure drop in the 10-30-psig. range will result when using the following rules:

For light stocks, i.e., in the naphtha-gasoline range, use an eduction ratio of 10:1. For medium-gravity, viscosity stocks in the distillate or crude range, i.e., about 30°-45° A.P.I., use an eduction ratio of 5:1.

For heavy viscous stock, i.e., in the residuum, asphalt range, i.e., below 20° A.P.I., use an eduction ratio of 3:1. Care should be taken not to mix fluids of flowing viscosities greater than 5,000 S.s.U. since the experimental data did not cover this range.

For a specific design case, it is satisfactory to use an eduction ratio between the above values using rough interpolation. Most of the eductor mixer designs have been for medium gravity stocks and 5:1 eduction ratios have been used. It has been usual practice to use 5:1 unless the stocks to be mixed are definitely heavy and viscous, or very light and nonviscous.

3. Sizing of suction tube . . . The suction-tube diameter is determined directly from Fig. 4 after the nozzle diameter and eduction ratio have been determined. This plot of suction-tube diameter versus nozzle size with eduction ratio parameters was established for a nozzle pressure drop of 25 psig., but is adequate within the 10-30 psig. range.

4. Sizing of discharge . . . The eductor discharge tube is the venturi through which both the liquid being pumped and liquid being educted are ejected into the tank. The diameter of this tube (vd on Fig. 2) and its length (vl on Fig. 2) are sized based on the following relationship to the suction-tube diameter, dimension sd on Fig. 2:

$$vd = 3/4\ sd \quad (7)$$

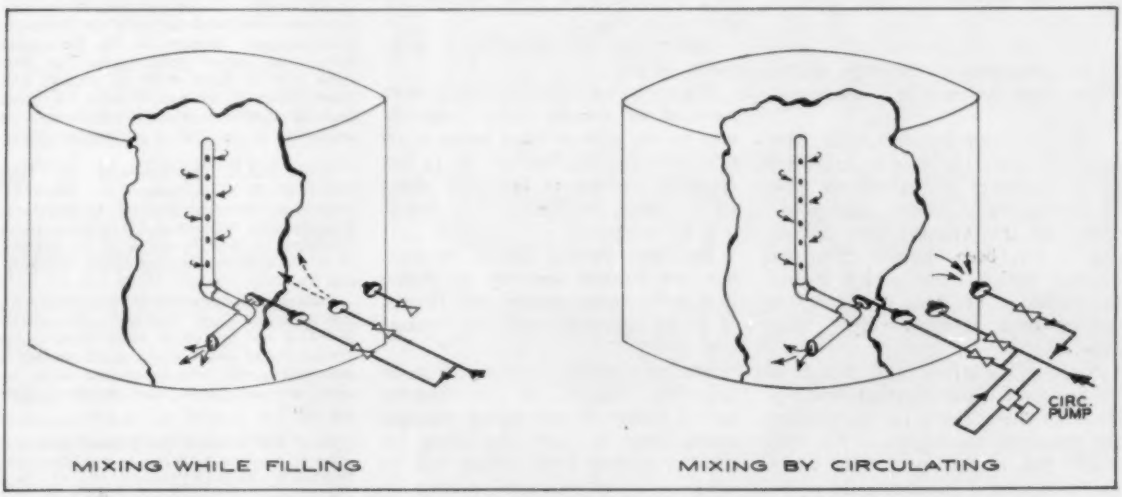
$$vl = 1.75\ sd \quad (8)$$

5. Mixer location and layout . . . The liquid being educted from the tank flows from different elevations in the tank through a vertical suction mixing tube located at the center of the tank to a horizontal suction arm and thence to the jet assembly of the eductor mixer.

The suction mixing tube is placed vertically as close to the tank center as possible. It is usually convenient to place it alongside of and attached to the center roof-support column.

The eductor mixer assembly proper should be placed at the end of the suction arm so that the ejected liquid is jetted tangentially with reference to the suction arm radius. For medium and heavy-oil service, i.e., for cases where the liquids mixed have less than 2-psig. vapor pressure, it is the usual practice to have the nozzle deflect upward slightly about 5°-10° to the horizontal. For light-oil service where the liquids mixed have a vapor pressure greater than 2 psig., the eductor is pointed horizontally.

A vertical distance from the tank bottom is selected such that any ob-



TWO PIPING ARRANGEMENTS may be used, depending on whether mixing while filling will be satisfactory or whether additional mixing after filling is required. Fig. 6.

structions, i.e., steam coils, etc., are cleared. Usually 2 ft. from the tank bottom will be a satisfactory distance.

The suction arm which is the horizontal connection from the vertical suction tube to the eductor mixer, should be two-thirds times the tank radius.

The eductor nozzle, once its dimensions have been established, is located in the eductor ell, according to Fig. 2. Its center is aligned directly with the center of the eductor discharge tube. Its tip is placed so that the center of the tip is directly in line with the extended outer perimeter of the eductor ell.

6. Nozzle jacket size . . . Having fixed the position of the eductor nozzle and knowing its dimensions, the length of the eductor nozzle jacket can be determined for fabrication purposes. A pipe size one size greater than that of the nozzle entrance pipe is usually selected.

7. Suction mixing tube . . . The vertical suction mixing tube should be extended upward to within 2 ft. of the tank top as measured by the uppermost point in the cylindrical shell of the tank. The upper end of the suction tube is left open.

A number of suction ports are selected so that each port is approximately 1 ft. from its adjacent port. With this spacing the eductor will draw at all times some liquid from each and every 1-ft. layer.

The suction ports are sized for a selected port velocity at maximum expected circulation rate assuming a full tank of liquid. The areas of these ports are graduated linearly, the smallest ports being at the bottom of the tube, so that progressively larger volumes of liquid are drawn from each succeeding high layer in the tank.

This flow distribution of educted liquid contributes to thorough mixing of the tank contents in a short mixing time.

The port velocity of suction port flow per unit area as it is expressed for convenience is determined from Fig. 5 depending on the average viscosity of the system being mixed. Fig. 5 has been derived from the original design curve which plotted the inches of net head drawdown or suction head versus average orifice flow.

Since a 12-in. or 1-ft. net head driving force is usually employed, Fig. 5 shows these flows versus viscosity for this single driving force. For light stocks the highest port flow which has been used in practice is 20 g.p.m. per sq. in. of port area corresponding to a linear velocity of 6.4 ft. per second. For heavy stocks the lowest port flow which has been used in practice is 6.2 g.p.m. per sq. in. corresponding to a linear velocity of 2.0 ft. per second.

If mixtures at flowing viscosities greater than 5,000 S.s.U., which is above the range of experimental data, are to be tried, it is suggested that a minimum velocity of 2.0 ft. per second be used as indicated on Fig. 5.

From the total circulation rate, number of ports, and average flow per unit port area, the average size of an individual port or middle port is determined.

The distribution of port area is determined by making the area of the top port twice that of the bottom and assuming a linear increase in port area from bottom to the top of the suction tube. Applying this rule, the area of the top port will be four-thirds that of the average or middle port, and the bottom port area will be two-thirds that of the average.

It is usual practice, once the individual port areas have been determined exactly, to round them off to the nearest ⅛ in. for construction purposes, and then to check the sum of the rounded-off areas to ascertain that the total area as constructed will be suitably close to the design area.

Other Considerations

In order to insure that turbulence due to direction change will not cut down eduction ratio, antiswirl vanes are installed before each direction change, i.e., at the bottom of the suction mixing tube and just prior to the eductor ell. These vanes should be made of thin plate in the form of a cross with axial length about 1½ to 2 pipe diameters. They should be located about 1 in. before the beginning of directional flow changes indicated in Fig. 2.

The eductor ell should be a long-radius elbow.

Materials used for the component parts of an eductor mixer assembly may be any pipe or sheet metal available that can be worked up to the required dimensions and will stand up in service in the fluid in which it is to be placed.

Sufficient rigidity should be built into the eductor assembly to insure that the eductor nozzle will remain in exact alignment with the venturi axis.

The inlet piping arrangement is an important feature of the eductor mixer. Either of two piping arrangements may be used depending on whether mixing while filling will be satisfactory, or additional mixing by circulating is desirable. Both are shown in Fig. 6.

While filling . . . To mix while filling, a separate inlet line is provided leaving the filling line upstream of the shutoff valve at the tank. This line, of entrance pipe diameter as sized previously, connects to the eductor nozzle.

All or part of the stream entering the tank can be directed through the eductor nozzle depending on the degree of mixing necessary and head available. This arrangement is shown in the left-hand sketch of Fig. 6.

After filling . . . To mix the tank contents after filling, as in a blending operation where additional mixing may be required, a separate suction line for circulation from the tank and a circulation pump must be available in addition to the inlet line to the eductor nozzle. The circulating pump takes suction and discharges back to the tank through the eductor nozzle.

The pump capacity and degree of mixing required will determine the duration of this operation. This arrangement is shown in the right-hand sketch of Fig. 6.

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BOOKS

GLACIAL AND PLEISTOCENE GEOLOGY by Richard Foster Flint, John Wiley & Sons, Inc., $12.50. A fresh study of the Pleistocene epoch based on up-to-date findings—with an enlarged treatment of glacial geology. This new book reflects the unprecedented advances in Pleistocene research during recent years. The author presents a new treatment of glaciology designed to be more meaningful for the study of glacial geology. There are discussions of sea-floor stratigraphy, soils, frozen-ground phenomena, and geochemical contributions to chronology and the measurement of temperatures. The book is based on Professor Flint's Glacial Geology and the Pleistocene Epoch, an earlier publication. The new book includes more detail on animals and plants than in the earlier book. A great deal of new stratigraphic informations is assembled in the form of correlation charts.

HYDRAULIC RESEARCH IN THE UNITED STATES, edited by Helen K. Middleton. National Bureau of Standards Miscellaneous Publication 221. 220 pp. $1.50. Published by Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

Information contained in this publication was compiled from reports by the various hydraulic and hydrologic laboratories in the United States and Canada. Each project is described briefly, and the present status, results, and any publications on the project are listed.

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Gyp Muds Now Practical For Louisiana Coastal Drilling

. . . thanks to a new thinner—ferrochrome lignosulfonate

By J. M. Hurdle, The California Co., Lafayette, La.

A NEW thinner, ferrochrome lignosulfonate, makes possible the control of flow properties of muds containing gypsum and salt. "Gyp" muds are thus made practical for Gulf Coast drilling and have been used to advantage by The California Co. in this area.

They have been particularly successful in two coastal Louisiana fields where salt-water flows are common. Time and cost of mud conditioning after salt-water flows were reduced and mud control was made easier with the new mud.

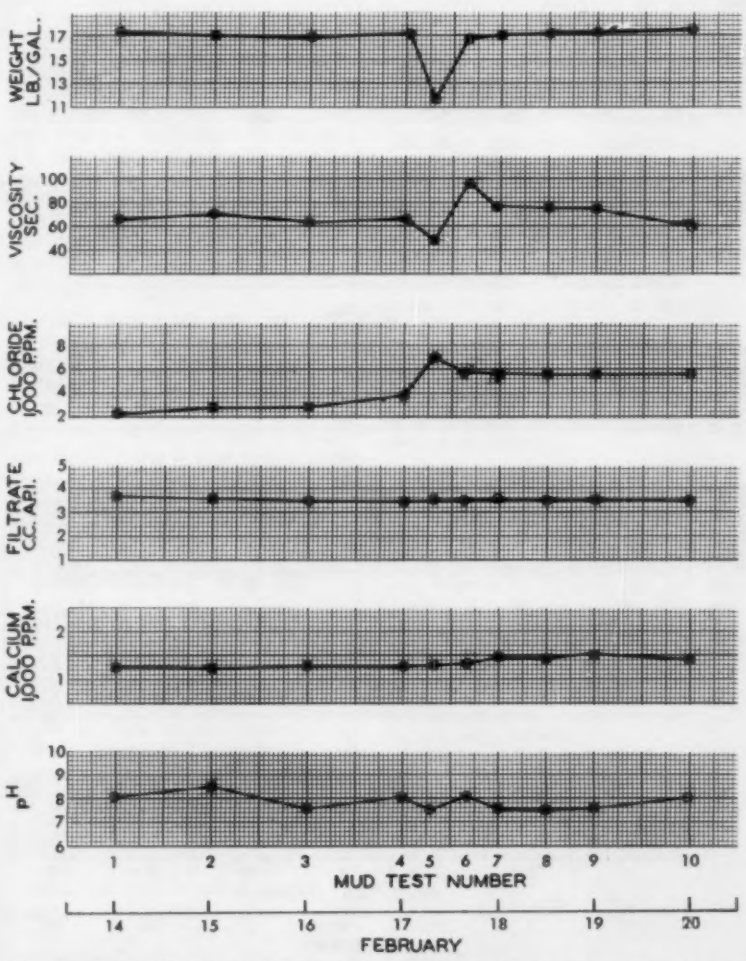
Well suited . . . Lime-treated muds have been widely used for drilling in the Gulf Coast area. The stability, ease of control, and economy of maintenance of lime-treated muds make them well suited for deep-well drilling.[1 2 3 4] High-weight muds with low gels and viscosities and low water losses can be maintained with a minimum of difficulty.

As well depths increase, high bottom-hole temperatures are met and one of the limitations of lime-treated mud is emphasized. The mud tends to thicken or gel excessively during periods of no circulation, particularly in deep, hot holes requiring heavy mud.[5] This gelation of the mud often causes difficulties in running wire-line tools, or results in excessive pressures required to break circulation after trips.

Because the solidification of lime-treated mud is caused by the reaction between lime and the siliceous materials in the mud[6] the troubles caused by stiffening of the mud can be avoided by leaving the lime out of the mud.

"Gyp" muds . . . There are advantages, however, in having a calcium-ion concentration in the filtrate of at least 200 p.p.m.[4] Calcium sulfonate, in the form of gypsum, plaster of paris, or anhydrite, is a convenient and economical source of calcium ions. The deliberate addition of gypsum to drilling muds came into general use about 1950 in the Rocky Mountain, Williston basin, and western Canada areas.[7] These so-called gyp muds found general acceptance as a result of their tolerance for salt-water and other formation contaminants and because of their economy.

It was early recognized that gyp muds, because of the high calcium-ion content of the filtrate, might have application in the Gulf Coast to prevent shale hydration. Gyp muds at this time were characterized by high gels and viscosities and were not deemed practical in Gulf Coast weighted muds if these rheological



PROPERTIES OF MUD used on well in the Umbrella Point, Grand Lake area of Cameron Parish, Louisiana. Fig. 1.

New material permits gel and viscosity control . . . and easy weighting

properties had to be controlled by water dilution. At this time there was no practical thinner other than water for the control of gels and viscosity in gyp muds.

New Thinner for Gyp Muds

Within the past 2 years, a new synthetic dispersant* has been developed which is not only highly effective in all water-base muds such as lime-treated, sodium, and sea water, but is also effective in gyp-treated muds. This material permits gel and viscosity control which has made gyp muds practical for Gulf Coast weighted muds.

Chemically, the material is broadly described as a ferrochrome lignosulfonate. Although it is derived basically from "spent sulfite liquor," which is a byproduct of the paper-pulping industry, the manufacturer describes the lignosulfonate as one which has been highly modified. The term lignosulfonate is generic in nature as it applies to a general group of lignin compounds which are formed as the result of the sulfite wood-pulping process.

These lignosulfonates may vary widely in properties depending upon molecular weight, degree of sulfonation, metallic ion tied onto the molecule, type of wood, etc.

Advantages of gyp muds . . . Gyp muds thinned with ferrochrome lignosulfonate have several advantages in Gulf Coast drilling. They can be weighted easily to the high weights required for deep drilling and can be maintained as low-gel, low-viscosity muds. The low alkalinity of a gyp mud results in higher mud resistivity and permits good electric-log interpretation.

Also, the low alkalinity increases stability of the mud at high bottom-hole temperatures. Consequently, the mud is suitable for use in deep drilling and to be left in the casing-tubing annulus on completion. Contaminants such as anhydrite, salt, or cement do not severely affect the flow properties of a gyp mud.

Resistant to salt water . . . The good tolerance to salt water exhibited by gyp muds should be of particular interest to Gulf Coast operators. High-pressure salt-water flows are frequently encountered and often result in loss of circulation, stuck drill pipe, or even abandonment of a well. Gyp muds have been used on wells in which salt water encroached into the well bore and the muds exhibited good stability while bringing the salt-water flow under control.

Field examples illustrate the stability of a gyp mud in the presence of salt-water contamination. In addition, the open hole exposed to salt water was found to be in much better condition than normally experienced with other muds.

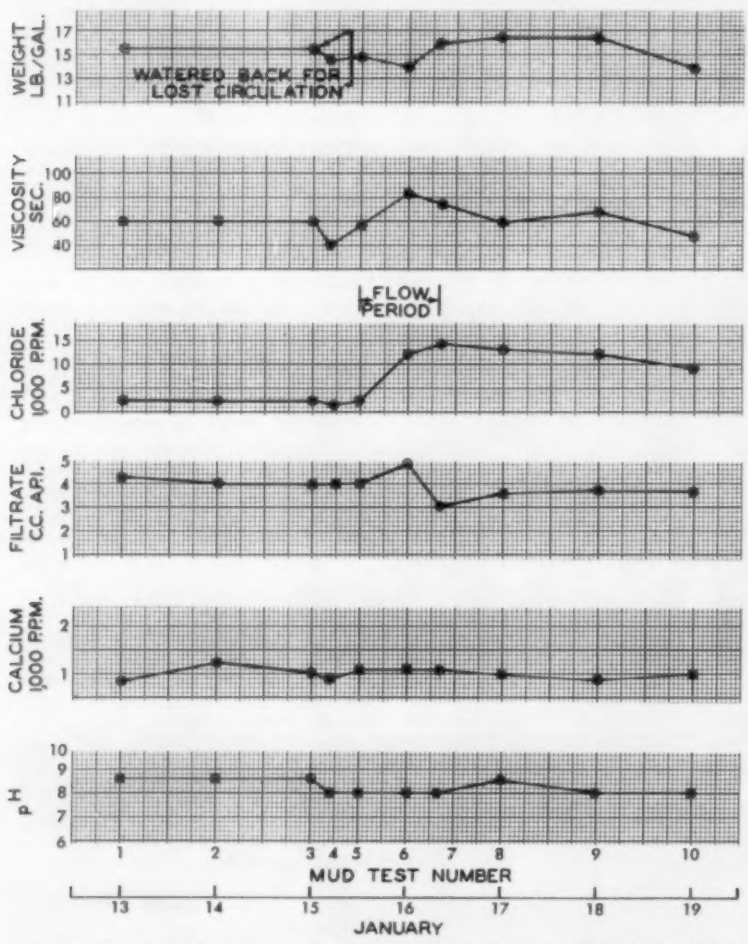
Easy preparation and maintenance . . . Preparation and maintenance of a gyp mud is similar to that of a lime-treated mud. To date, four native mud systems have been converted to gyp muds. Three of the conversions were made while circulating inside protective casing and one while drilling. The amount of chemical required for each conversion was approximately: caustic soda, 0.2 to 0.3 lb. per bbl.; ferrochrome lignosulfonate, 4 lb. per bbl.; gypsum, 3 to 4 lb. per bbl.; and C.M.C., 0.4 to 0.5 lb. per bbl., depending upon the desired water loss.

Normal chemical treatment for maintenance consisted of from 25 to 50 lb. caustic soda per tour, 150 to 200 lb. ferrochrome lignosulfonate per tour, and 100 to 200 lb. gypsum per day. C.M.C. was added only as necessary to maintain desired water loss.

Field Usage

A gyp mud was used in the drilling of a well in the Umbrella Point, Grand Lake area, of Cameron Parish, Louisiana. A salt-water flow was encountered while drilling below 7-in. protective casing. Average mud properties prior to, during, and after the salt-water flow are shown next page.

*Q-BROXIN (trade name registered and patent pending). Developed by Puget Sound Pulp & Timber Co., Bellingham, Wash., for application in oil-well drilling muds and field tested by Product Development Co., Houston. Baroid Division of National Lead Co. is distributor.



PROPERTIES OF MUD used on well in the Gillis English Bayou field, Calcasieu Parish, Louisiana. Fig. 2.

	Before	During	After
Weight, lb. per gal.	17.1	11.7	17.3
Viscosity, funnel, sec.	65	46	60
Initial gel, g.	0	0	0
10-minute gel, g.	10	15	15
Filtrate, A.P.I., cc.	3.8	3.4	3.5
Cake, 32nd in.	2	2	2
pH	8.0	7.5	8.0
Chloride, p.p.m.	3,600	6,900	5,700
Calcium, p.p.m.	1,200	1,240	1,280

The open hole (769 ft.) below the 7-in. protective casing stayed in good condition and little time was lost getting back to bottom after the flow was brought under control.

Mud properties . . . Properties of the mud used on this well are shown in Fig. 1. Mud tests 1, 2, and 3 are for consecutive days prior to the salt-water flow and show the general properties of the mud before salt-water contamination. Tests 4, 5, 6, 7, 8, and 9 were made during the salt-water flow period.

Mud test 4 shows a slight increase in chlorides and viscosity. This indicates the possibility that the zone that kicked was drilled and later caused trouble.

Test 5 was made when the returning mud was salt-water cut and showed a reduction in mud weight and viscosity. Chloride content on this sample was 6,000 p.p.m. Drill pipe was then pulled into the protective string of 7-in. casing. The mud weight was increased to 16.9 lb. per gal. and the flow was brought under control.

Mud test 6 was made on returns after running drill pipe back to bottom and showed some increase in viscosity and gels. The viscosity and gels were reduced by treating the mud with ferrochrome lignosulfonate.

Tests 7, 8, and 9 show the mud properties during the leveling-out period after the flow was brought under control. Mud test 10 was made 24 hours after the flow was brought under control and shows the mud properties after drilling was resumed.

Low cost . . . The total cost of weighting material, chemicals and lost-circulation materials used to bring the flow under control was $3,093 or $3.09 per barrel of mud. The total cost of chemicals used to treat the mud system was 24 cents per barrel. The low cost of chemicals used for treatment is very indicative of the stability of gyp mud when contaminated with salt water.

Flexibility of Gyp Mud

Gyp mud was used in the drilling of a well in Gillis English Bayou field, Calcasieu Parish, Louisiana. This well was a good example of the flexibility and ease of control of a gyp mud during deep-drilling operations. A lost-circulation zone was drilled into at 10,330 ft. and drill pipe was pulled into protective casing set at 9,210 ft. The mud weight was reduced from 15.8 to 14.5 lb. per gal. It was not necessary to add any chemicals during the watering-back operations.

Three stands of drill pipe were run in and circulation was established. Another three stands were run in and at this point the well started coming in. The blowout preventer was closed and the shut-in pressure was 850 psig. Mud weight was increased to 15.8 lb. per gal. and the flow was brought under control.

Average mud properties of the gyp mud prior to, during, and after the lost-circulation and salt-water flow period are:

Weight, lb. per gal.	15.4	14.5	14.0	16.3
Viscosity, funnel, sec.	58	40	84	68
Initial gel, g.	0	0	0	0
10-minute gel, g.	6	4	15	10
Filtrate, A.P.I., cc.	4.2	3.9	4.8	3.6
Cake, 32nd in.	2	2	2	2
pH	8.5	8.0	8.0	8.0
Chloride, p.p.m.	1,550	1,750	12,000	12,000
Calcium, p.p.m.	800	1,000	1,040	780

Mud tests . . . Properties of the mud used on this are shown in Fig. 2. Mud tests 1 and 2 were made on consecutive days before the trouble occurred and show the general properties of the mud while drilling. Test 3 was made just prior to losing circulation and test 4 shows the properties of the mud after the weight was reduced to regain circulation.

Test 5 was made just before the salt-water flow occurred, test 6 was made on a sample of salt-water contaminated mud, and test 7 was made on the mud used to bring the flow under control. Mud tests 8 and 9 were made 3 and 5 days, respectively, after the flow occurred, and test 10 was made after the mud had been watered back for completion of the well.

The amount of chemical added for corrective treatment of the mud during the salt-water flow was approximately 0.7 lb. per bbl. ferrochrome lignosulfonate and 0.3 lb. per bbl. caustic soda. C.M.C. was added as necessary to control water loss. No gypsum was added. There was an increase in the calcium-ion content which indicated the presence of calcium salts in the salt-water flow.

Conclusions

Gyp mud systems thinned with ferrochrome lignosulfonate have been successfully used on several wells in the Gulf Coast area. These muds have been proved to be practical and economical, and offer some definite advantages over other types of muds. The high calcium-ion content of the filtrate reduces hydration of troublesome shales and permits the drilling of close-to-gage holes.

Gyp muds have exhibited exceptionally good resistance to salt-water contamination. Low-alkalinity gyp muds are very resistant to high-temperature gelation. The easy preparation and maintenance of these muds and their stability in the presence of formation contaminants make them very desirable for drilling and completion operations.

Acknowledgment

The author wishes to thank the management of The California Co. for permission to publish this paper; also Warren L. Thomas and the production department for their cooperation and assistance in field trials of the mud systems.

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Radioactivity will be studied at Houston

A 3-day symposium on applications of radioactivity in petroleum exploration and production will be held at the Shamrock Hotel, Houston, November 6-8. The first day will be devoted to research and instrumentation, and the second and third days will cover field use of radioactivity and logging. Speakers are from industry, research laboratories, universities, and government agencies. The symposium is sponsored by Tracerlab, Inc.

New Squeeze for Lost Circulation . . .

. . . needs no special equipment
. . . is more workable and flexible
. . . has effect of hard plug but will not cause sidetracking or cave-in

By David R. Ruffin
Sunray Mid-Continent Oil Co.

A NEW squeeze treatment for sealing off lost-circulation zones has proved successful. After each of 10 treatments on three different wells, full returns were regained and drilling was successfully resumed.

The new squeeze contains Attapulgate clay, barite, and lost-circulation material. A solution of these materials is spotted in the drill pipe, and the regular mud is displaced from the drill string. The squeeze mud is then pumped into the formation and allowed to set for approximately 12 hours.

No special equipment is needed for pumping or mixing. The squeeze is workable and flexible, and forms a comparatively hard plug without causing sidetracking or later cave-ins.

Causes of lost circulation . . . Lost circulation in South Louisiana is caused by fluid loss to porous formations and by splitting or rupturing the formation due to hydrostatic pressure. This splitting may take place in a variety of formations if the strength of the formation is less than the hydrostatic head applied by the mud column.[1] Mud lost to porous formations is generally near the surface and mud lost due to splitting or rupturing is at deeper depths.

For this reason protective casing will usually be set before high-pressure formations are drilled and high mud weights are required. Since high mud weights are required throughout South Louisiana, splitting or rupturing the formation is considered the most universal reason for lost returns and the most difficult to correct.

Another factor is if a large volume of fluid is lost into a splitting formation, a washing effect will be created across the face of the fracture, tending to enlarge the opening and thereby making it more difficult to plug.

Lost-circulation problems . . . These can be divided into three classes:

1. Partial loss, which can range from a few barrels per hour up to the major portion of mud being pumped. This can usually be controlled by additions of lost-circulation material to the mud system and better control of the mud rheology.* Often a small reduction in the pump pressure and better control of the drill-pipe movements will insure full returns.

However, it is believed that pump pressure should be reduced for only a short period of time. If this is extended for prolonged periods of time, more damage may result than any advantage gained.

2. Loss of returns, where the hole will stay full or will fill up after a short period of time. Usually, if after pulling up in the protective casing the mud is allowed to set for a few hours, full returns can be obtained. Then corrective measures such as outlined in No. 1 can be applied. If lost-circulation material is used, it is sometimes advantageous to bypass the shale shaker for a few days to insure a complete sealoff.

3. Complete loss of returns and breakdown of the formation. This is the most difficult to correct. It may require a long time and substantial additional mud costs before full returns can be regained. In this type of loss, returns may be obtained but can be lost again at the slightest provocation.

Because of this a complete and permanent plugoff of the lost return zone is essential for successful operations. This has usually been done by squeezing a specific material into the formation. The remedial measures mentioned for No. 1 and No. 2 will also apply here but cannot usually be applied until a plugoff is obtained.

Squeezing off . . . Lost-circulation or bradenhead squeezes are used only as a final measure in correcting a thief zone. According to Rogers,[2] "formation-cementing agents are materials which are pumped into the porous zone in a fluid state with the expectation of their setting to form strong plastic or solid bodies filling the pores, fissures, or crevices and preventing further fluid loss."

There are several types of materials that are available and can be used for squeezing. Some of these are: (1) portland cement, (2) special cements, (3) bentonite and diesel fuel or cement and diesel fuel, (4) lost-circulation materials, either separate or in combination, and (5) gel plugs. There are other materials available but these are the ones most frequently used.

A variety of these materials was tried by the South Louisiana district of Sunray Mid-Continent with only temporary success at best. We decided that something should be used which would be easy to prepare, flexible, pumpable, and would form a tight sealing bond in the lost-circulation zone.

Special squeeze . . . With these points in mind a special squeeze was prepared using Attapulgate clay, barite, and lost-circulation material.

Attapulgate clay has the same suspension characteristics as bentonite but has little effect upon inhibition of fluid loss. It is used in saturated salt or salt-water muds because it does not flocculate or became contaminated by sodium chloride.

Aattapulgate clay was used in this squeeze because it would suspend the barite and lost-circulation materials, and it would have a high fluid loss when squeezed into the formation. Barite was used to increase the weight to correspond to the mud weight in the hole.

Lost-circulation material was used for two reasons: (1) to plug off the pore spaces leaving a foundation for the clay and barite, and (2) to help bond together the squeeze after it had begun to set up.

This squeeze was used with the assumption that if the filtration rate

*For the purpose of this article it is assumed that the mud weight cannot be reduced.

was high enough, all the liquid phase would dehydrate. This would leave clay, barite, and lost-circulation material to plug off the zone of loss.

Good results . . . This squeeze method has been prepared and used 10 times on three different wells with good success. After each squeeze, full returns were regained and drilling resumed. On one well the first complete loss came with 16.2-lb. per gal. mud. After squeezing off four different zones, a maximum mud weight of 17 lb. per gal. was used successfully and the hole was completed.

To date this squeeze has been used only with high-weight muds—16.2 lb. per gal. has been the lightest and 18 lb. per gal. has been the heaviest. However, there is no apparent reason why it could not be applied to lighter weights with the same success.

The method of preparation for this type of squeeze is relatively simple:

1. The suction tank is cleared of all mud and washed clean.

2. A predetermined amount of fresh water is placed in the suction tank. (It has been the practice to use twice the amount of mud required to fill the open hole, if this does not exceed 50 bbl.)

3. Attapulgate clay is added to the water. (The amount will depend upon the final mud weight desired. For 17-lb. per gal. mud about 6 lb. per bbl. has given the best results.)

4. Barite is added to increase the weight to correspond to the mud weight in the hole.

5. Lost-circulation material is added. (The best mixture we have found is approximately 20 lb. per bbl. of fibrous nut shells and 4 lb. per bbl. of other fibrous material, preferably cloth or nylon threads.)

The filtration loss at this time should be about 35 to 40 cc. for a 30-minute A.P.I. test. On one test, the 30-minute water loss was 36 cc.; 1 hour, 54 cc.; 2 hours, 65 cc. The filter cake after 30 minutes was approximately ¾ in. thick and after 1 hour over 1 in. thick.

Cost . . . The cost of preparing this squeeze is approximately the same as mud of equivalent weight. Attapulgate clay sells for $65 per ton. The major cost item is weight material. The amount and type of lost-circulation material will also affect the cost.

After the squeeze has been prepared it is spotted in the drill pipe with the bit at the bottom of the protective casing. It is not necessary to be open ended but a full open bit is best against plugging. After all the mud has been displaced from the drill pipe, the blowout preventers are closed and the squeeze mud pumped into the formation. The mud is allowed to set for approximately 12 hours after which it is circulated and conditioned inside the casing before attempting to go to bottom.

Care must be exercised in attempting to return to bottom. Some of the squeeze material may have been left in the hole down to the zone of loss and a heavy wall cake developed. It has been necessary in some cases to ream and recondition portions of the hole.

The major disadvantages to this type squeeze are:

1. Some of the Attapulgate clay will get into the normal drilling mud creating additional water loss which will have to be treated out.

2. Possibility of heavy wall cake down to the zone of loss.

This is one of the better types of lost-circulation squeezes. It does have the limitation that only relatively small amounts of open hole to the thief zone can be tolerated. However, because of its flexibility this type squeeze can be safely used in larger amounts than most other types.

References

1. Rogers, W. F., "Composition and Properties of Oil Well Drilling Fluids." Revised edition, Gulf Publishing Co., Houston, 1953.
2. Ibid.

California Standard Enlarging Two Departments

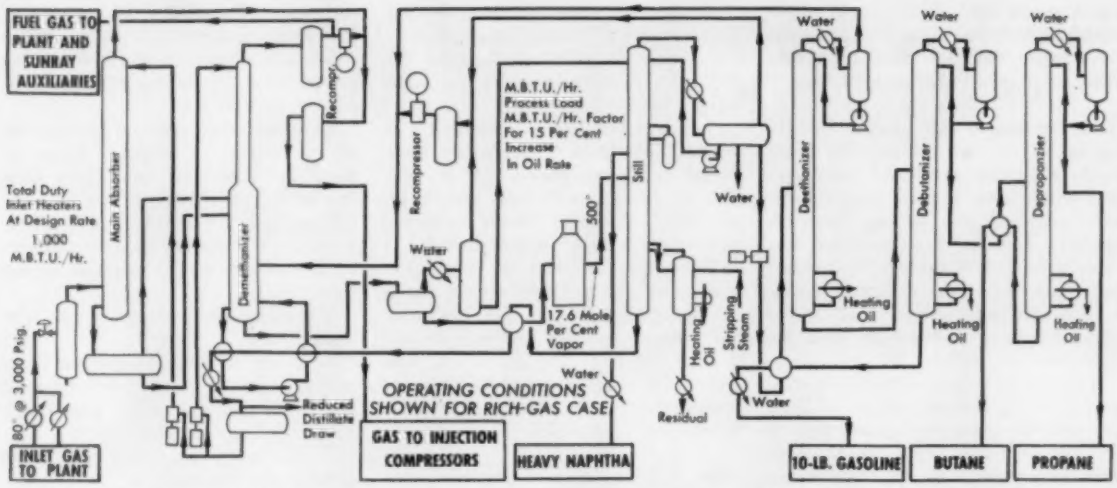
TO MEET increasing research and operational demands, subsidiaries of Standard Oil Co. of California are constructing two new buildings and enlarging a third at the La Habra laboratories.

A 17,000-sq.-ft. laboratory building is being erected for California Research Corp., which carries out research, development, and technical service for Standard of California and its subsidiaries throughout the world. This activity's usable area and manpower has been more than quadrupled since established at La Habra in 1947.

A 41,000-sq.-ft. exploration department building is under way for Standard Oil Co. of California, Western Operations, Inc., and other additions are being made. The combined projects will cost more than a million dollars.

California Research Corp.'s new building, its third major laboratory in the area, will be a two-story, all-concrete, air-conditioned structure. It will house laboratories for portions of the geological and producing research activities, as well as general, clerical and accounting offices, conference room, drafting room, and related areas. Completion is scheduled for early next year.

The new exploration building, being erected for Standard Oil Co. of California, Western Operations, Inc., lies at the opposite end of the campus, and will provide facilities for some 150 employes to be relocated from the Los Angeles downtown office. Its 63 offices will handle geological, geophysical, and land and lease personnel, the supporting drafting and photo reproduction services, etc. Completion is expected in mid-1958.



SIMPLICITY OF OPERATION is the main feature of Sunray's cycling plant near Churchpoint, La. This is well illustrated by this simplified flow diagram. Fig. 1.

Cycling Plant Is One-Man Operation

. . . and it features a safety-shutdown system

By Larry Resen
District Editor

PROCESS section of the plant is equipped with safety shutdown devices to enable operation with one man per shift.

SIMPLICITY was the keynote behind the design of Sunray Mid-Continent Oil Co.'s Northwest Branch cycling plant near Church Point, La.

As a result, the plant—which processes 27,000,000 cu. ft. of gas per day—is being operated with one man per shift.

A companion feature here is the inclusion of a safety shutdown system on the absorption and distillation facilities.

A hot-oil circulating system is used to furnish heat for fractionation as well as for the generation of steam both for stripping and utility purposes.

The Northwest Branch plant, constructed by Tuloma Builders, Inc., Tulsa, receives the input gas stream at a pressure of 3,000 psi. Field pressures run from 3,500 to 6,500 psi., with the wells choked in to provide the desired delivery pressure to the plant. Residue gas, at a pressure of 2,000 psi., is piped directly to recompression units at the individual injection wells.

High-pressure piping is avoided between the plants and wells this way. One sand receives its recycled gas at 4,500 psi. and the other at 6,500 psi. Two 265-hp. skid-mounted compressors are used to inject into the lower-pressure sand and three 440-hp. compressors are used for injection into the high-pressure sand.

Process flow may be easily traced through on the accompanying flow sheet (Fig. 1). The following points should be noted, however.

Inlet scrubbers are set up to operate at a maximum of 2,050 psig. The plant pressure is controlled by a back-pressure controller operating on the absorber residue scrubber.

Condensed hydrocarbons from the inlet scrubbers are normally processed through a 480-lb. flash tank, which is also designed as a surge tank for the demethanizer. Provisions are set up to take the distillate directly into the deethanizer, if operations should so dictate.

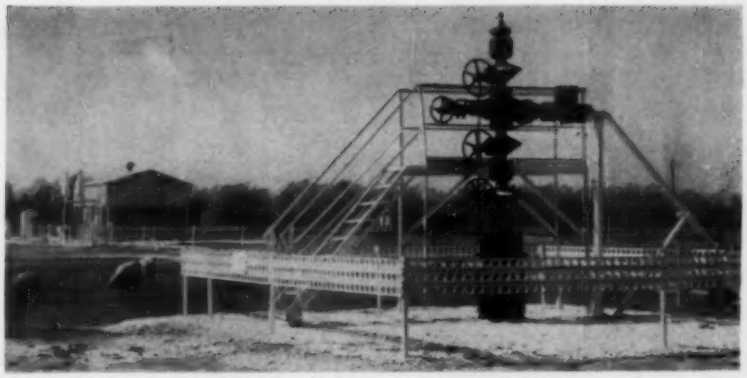
The absorption - distillation section uses a rich-oil demethanization cycle. Rich oil from the base of the main absorber normally joins condensate from the inlet scrubbers and passes through the flash tank into the demethanizer. The heated rich oil is injected on tray 31 of the demethanizer which operates at about 355° F. on full-load conditions. The base tempera-

ture can be controlled to give correct loading conditions for the low-stage cylinders on the recompressors. Plant efficiency as measured by the heat input will be greater with low base temperatures than with high ones.

The still is set up to operate with incoming rich oil preheated to 500° F. and a pressure level of 125 psi. held on the still reflux drum. The still's pressure control has a split-type controller arrangement. If total condensation is not being obtained in the still reflux drum, vapors are bled off the drum by a control valve and sent to the reflux condenser. If operating conditions are such that total condensation is being obtained in the still reflux drum, a control valve opens to admit makeup vapors to the tank in order to provide a set pressure level for still operation.

A hot-oil circulating system furnishes heat for fractionation and for the steam generator. This is designed to furnish process steam to the still at a rate of approximately 0.2 lb. of steam per gallon of lean oil circulated. Additional steam is available for utility purposes. The hot-oil system is tied into the main absorber system for receiving makeup oil. A hand-control bleed is used to return oil to the lean-oil system. This is the method used to keep the heating system oil free of carbon and sludge.

Shutdown . . . Use of but one operator per shift made the design of a safety shutdown system of utmost importance. The final selection found a combination electrical and air system put into use (Fig. 2). A restriction device on the air shutdown system is used to avoid shutdowns due to instantaneous power failures. The safety equipment operates to shut down all or part of the plant and/or sound an alarm when operating conditions so warrant.

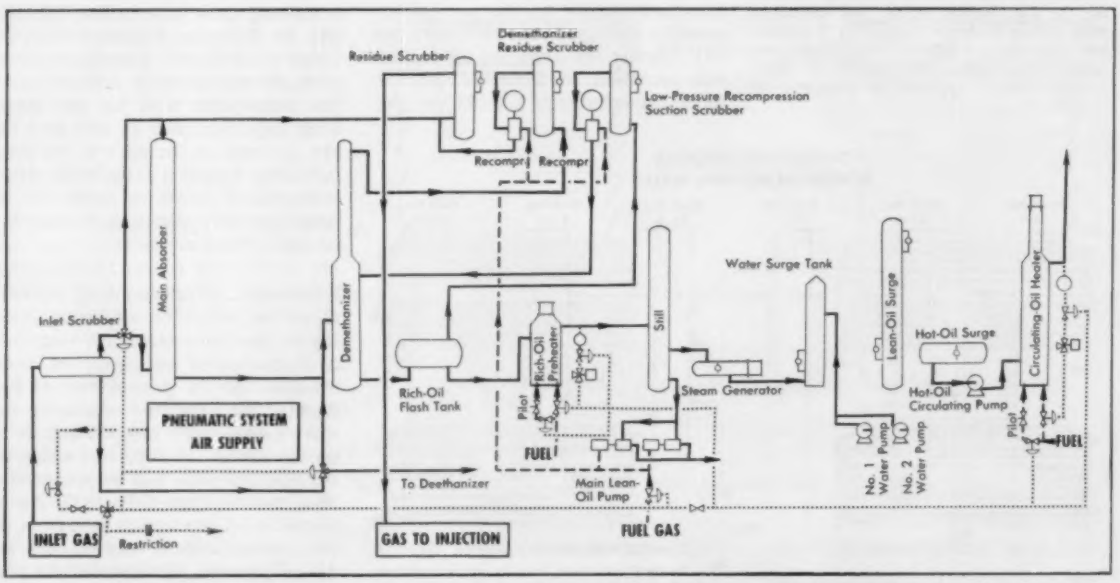


RESIDUE GAS is recompressed and sent to injection wells such as this for return to the formation.

The air system is controlled by a solenoid - operated, three - way valve which is normally energized. Air pressure on the system operates diaphragm valves on the gas input to the rich-oil heater, to the circulating-oil heater, to the lean-oil-pump engines, to the gas compressor, and to bypass valves in gas and liquid lines at the absorber. When electric power is interrupted, the solenoid valve is deenergized. This causes the air to bleed off through the vent port. A restriction on this port, however, is sized so that the air bleeds slowly. The diaphragm valves remain unaffected by the gradual drop in air pressure for a period of 4 seconds. Should the power failure last longer than this, the air will continue bleeding off and the diaphragm-actuated valves will close shutting down the equipment. However, should the power failure be of an instantaneous nature, less than 4 seconds, the solenoid will be reenergized and the air pressure restored to the shutdown system. The main air solenoid has an automatic reset so this procedure may take place.

Acknowledgment

Cooperation of the management of Sunray Mid-Continent Oil Corp. and assistance of C. C. Smith, plant superintendent is gratefully acknowledged.

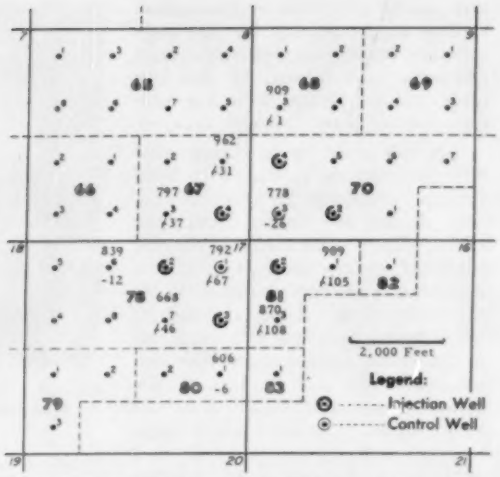


SAFETY SHUTDOWN SYSTEM is of utmost importance since the plant has only one operator per shift. A combination electrical and air system was finally selected for use. The equipment operates to shut down all or part of the plant and/or sound an alarm when operating conditions warrant such action. Fig. 2.

Fullerton field shows . . .

How Fractured Limestone Responds To Water Flooding

. . . A report on secondary-recovery operations in the Clearfork unit



GREATER PRESSURE INCREASES occurred in producing wells which were adjacent to two or more injection wells. These data represent November 1956 bottom-hole pressure and May 1956 to November 1956 pressure differential. Fig. 7.

By W. E. Nolan and G. R. Locker

Part 2 of Two Parts

A DOUBLE five-spot pilot water flood has been in operation in the Fullerton Clearfork unit, northeastern Andrews County, Texas, since February 24, 1956.

As of July 1, 1957, a cumulative total of 2,031,469 bbl. of water has been injected into the six injection wells. Extreme reductions in producing gas-oil ratios from the range of 15,000 cu. ft. per barrel to solution ratio approaching 500 cu. ft. per barrel have been noted in several area producing wells.

Author Nolan is unit engineer for Monterey Oil Co., Hobbs, N. M., and Locker is with Fitting & Jones Consulting Engineers and Geologists, Midland, Tex. Paper presented at A.I.M.E. Permian Basin Conference. Part 1 appeared in the issue of October 7.

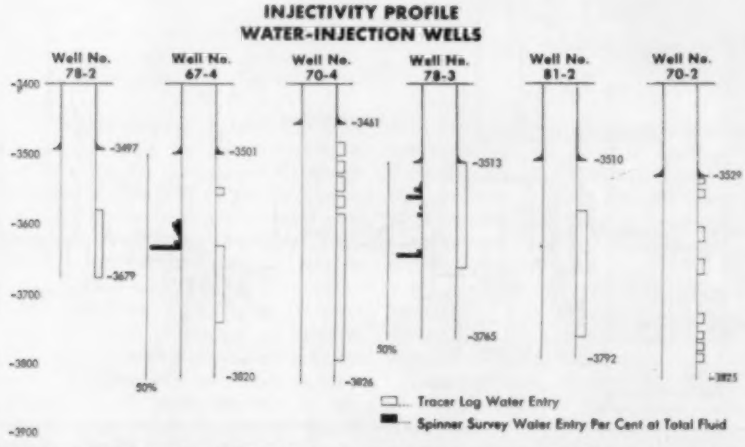
Production rates have increased in each of the two control wells from 15 bbl. of oil per day to the present rate of 100 to 120 bbl. of oil per day. A total of 10 area producing wells have evidenced water flood effects in the form of gas-oil ratio decreases and/or oil production rate increases.

With the exception of unit wells 78-1 and 81-3 no water breakthrough has occurred. In unit well 78-1 water production first occurred in January 1957. The rate of water production increased rapidly to the present apparently stabilized rate of 70 bbl. per day. During this time the oil production increased from 13 bbl. per day to the present rate of 100 bbl. per day.

Unit well 81-3 also showed water production occurring in January 1957. During the period of January 1957 to July 1957, the oil production rate increased from 13 bbl. per day to 30 bbl. per day, while the water production has gradually increased to the current rate of 100 bbl. per day.

The cumulative injected water volume as of July 1, 1957, would occupy 8.2 per cent of the estimated hydrocarbon volume in the 480-acre area which would include the control wells and each adjacent outside offset well to the six injection wells.

Results show that water injection into the Fullerton Clearfork reservoir forms water-flood oil banks and these oil banks are moved by injected water. The initial water flood has also shown water injection rates of 500 to 1,500 bbl. per well on the edge of the field, indicating injection rates with similar pressures of 2,000 to 4,000 bbl. of water per day per well in the best portion of the reservoir.



ZONES OF FLUID DEPARTURE in the water injection wells. Maximum coverage of 100 per cent of the porosity is indicated in well 70-4. Minimum coverage of 55 per cent of the porosity is indicated in well 67-4. Fig. 6. (First five figures are in Part 1.)

Efficiency . . . The remaining unknown factor in evaluation of water flooding of this reservoir is the degree of conformance or efficiency of water flooding. At the present rate of production the estimated remaining primary recovery of 144,000 bbl. to be obtained from the 160 acres within the six injection wells will be produced in 19+ months from July 1957. An increase in oil production rate from the two control wells is very possible and would decrease the time element prior to recovery of estimated primary oil.

Full-scale flooding will not be a tight pattern flood but will take the

form of a line drive either crestal, diagonal or peripheral due to the relatively high injection rate compared to the estimated producing rates of the surrounding wells. A 2,000-bbl. per day rate of injection can supply sufficient injection water and reservoir energy for six or eight producing wells per injection well.

On the basis of estimating ultimate recovery from water flooding to be twice the primary, the remaining primary and secondary recovery reserves as of July 1, 1957, would be 206 million barrels. A continuance of the current rate of production of 10,000 bbl. of oil per calendar day would require 51 years to produce the total oil volume. An increase in oil rate from the reservoir to an average of 20,000 bbl. per calendar day would result in depletion of the Fullerton Clearfork reservoir in 26 years.

On the basis of the 20,000 bbl. per calendar day rate and the 26-year operating time to depletion, an estimated capital expense for water flooding, maintenance expense and operating expense total $133,800,000, or a total expense of 65 cents per barrel production cost.

Pilot Program

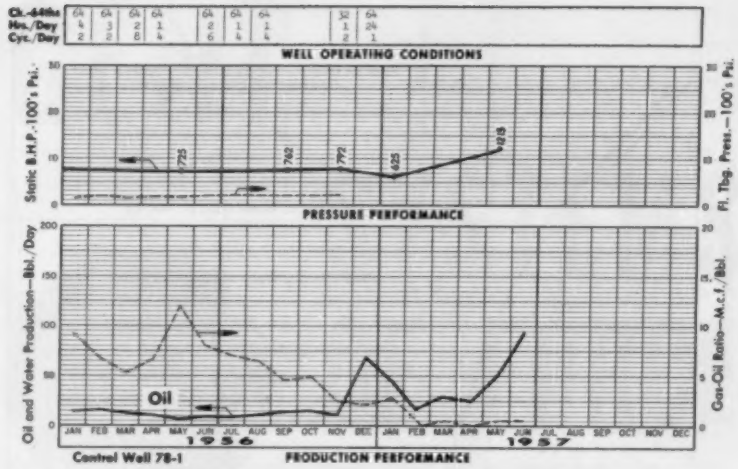
A double five-spot with six producing wells converted to injection wells, and with 80-acre spacing for the center producing wells was selected for the first pilot water flood. Fig. 1 (Part 1) shows the location of this pilot flood.

Source of injection water is the Santa Rosa sand at a depth of 1,200 to 1,500 ft. This formation is a blanket-type sand existing throughout the field. The apparent capacity of the water-supply well is 15,000 bbl. of water per day. Current capacity represents the downhole pump mechanical limitation of 4,500 bbl. per day.

Water handling . . . Supply water has less than 1,500 p.p.m. total solids and no treating problem has occurred. The water-flooding system is essentially a closed system with 35-psi. gas pressure held upon the annulus of the water-supply well and with refined-oil blankets covering the water in the tanks.

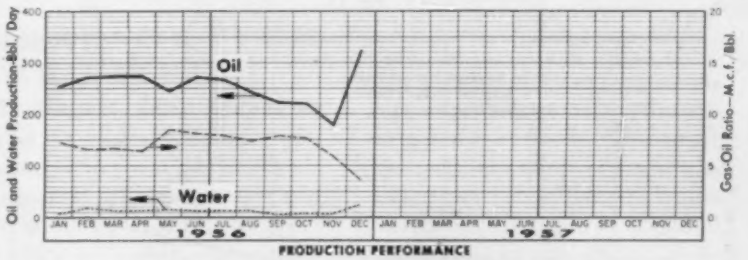
Water-flood plant equipment consists of two 100-hp. single-cylinder gas engines driving two triplex pumps. One filter-aid-type filter with maximum capacity of 8,000 bbl. per day constitutes the filtering equipment for this plant.

Plant tankage consists of one 1,000-bbl. raw-water tank, one 1,000-bbl. surge tank, and one 1,000-bbl. clear-water tank. Pressure regulators are installed on the individual injection



WATER-FLOOD-AREA PRODUCING-WELL PERFORMANCE

Fig. 8



PRODUCING-WELL PERFORMANCE SUMMARY
OF WELLS NO. 67-1, 67-3, 68-3, 70-1, 70-3, 70-5, 78-1, 78-6, 78-7, 80-1, 81-1, 81-3
WATER-FLOOD AREA

Fig. 9

RESERVOIR ZONES OIL CONTRIBUTIONS
PER CENT RECOVERY OF INITIAL STOCK-TANK OIL IN PLACE

Fig. 10

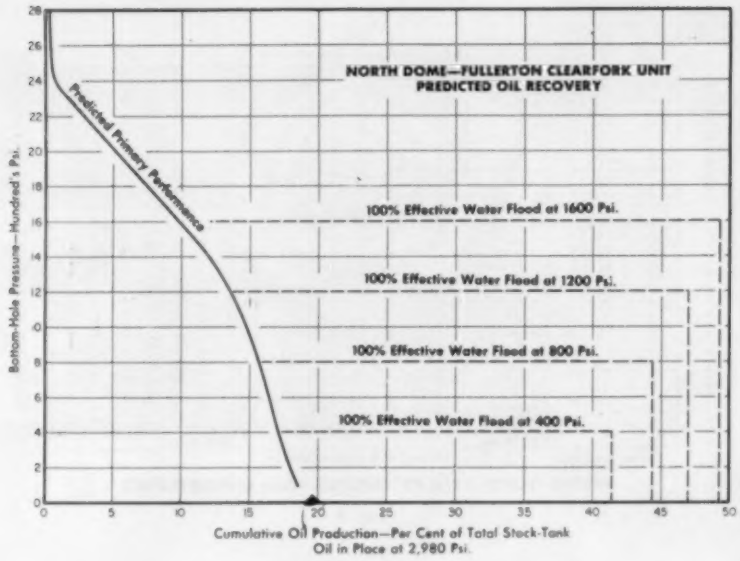

NORTH DOME—FULLERTON CLEARFORK UNIT
PREDICTED OIL RECOVERY
Predicted Primary Performance
100% Effective Water Flood at 1600 Psi.
100% Effective Water Flood at 1200 Psi.
100% Effective Water Flood at 800 Psi.
100% Effective Water Flood at 400 Psi.
Bottom-Hole Pressure—Hundred's Psi.
Cumulative Oil Production—Per Cent of Total Stock-Tank Oil in Place at 2,980 Psi.

Fig. 11

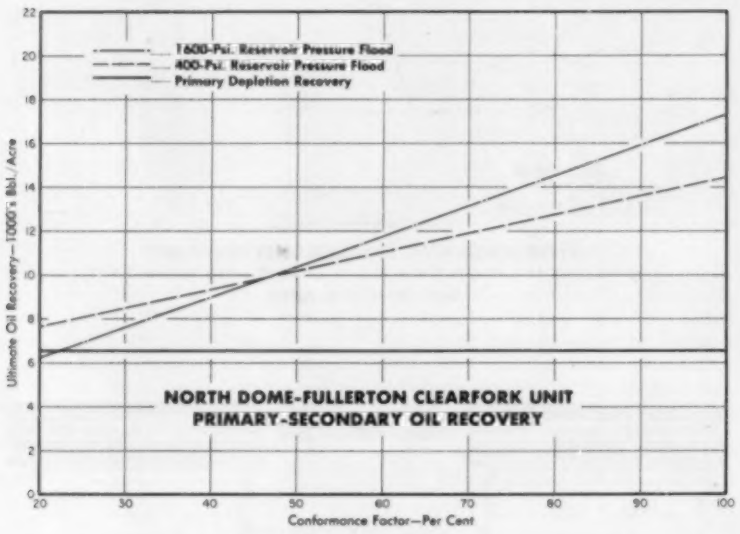


Fig. 12

lines so that the desired flow rate to a given well is regulated by adjustment of line pressure to that well.

Injection-Well Performance

Water injection has been down the casing and into the open-hole sections of the injection wells. Gross open-hole sections exposed vary from 182 to 365 ft.

Based upon radioactive-log interpretation the total reservoir pore volume exposed to injection varies from 32,100 to 102,800 bbl. per acre. Individual-well injection rates currently range from 500 to 1,100 bbl. per day with surface injection pressures ranging from 880 to 1,200 psi.

Water flooding commenced on February 14, 1956. No increase in injection capacity has been observed during the first 10 months of pilot-flooding history. No indications of formation plugging or fillup in the open-hole sections have been noted.

Injectivity surveys have been run in all injection wells. Radioactive-tracer and spinner-type fluid surveys indicate that the injection water is departing from the well bore through a minimum of 55 per cent of the exposed porosity.

Fig. 6 shows the zones of fluid departure in the injection wells. Maximum coverage of 100 per cent of the porosity is indicated in Well 70-4 and minimum coverage of 55 per cent of the porosity is indicated in Well 67-4.

Porosity Fill-Up

Pore volume was estimated from radioactive logs of the injection wells and control wells in the producing area. In the injection area, total pore volume is 2,699,800 bbl. per 40 acres. Fluid saturations at the initiation of water flooding were estimated to be 19.0 per cent gas, 57.4 per cent oil, and 23.6 per cent water. With these estimated fluid saturations, reservoir gas, oil, and water volumes at the start of water flooding were as follows:

RESERVED VOLUME DISTRIBUTION

	Bbl. per acre	Total bbl. per 480 acres
Total porosity	67,495	32,398,000
19.0% gas saturation	12,824	6,155,620
57.4% oil saturation	38,742	18,596,452
23.6% connate water	15,929	7,645,928

Pilot-Flood Reactions

The first reaction in the waterflood area was in the form of pressure increases from producting wells. Fig. 7 shows the November 1956 reservoir pressures and the differences in producing well pressures between May and November 1956.

Note that an average 1956 pressure was 778 psi. and 35 psi. pressure buildup had occurred in November 1956. The first pressure increases occurred in the down-pressure, lower-porosity portion of the area. The two pressure increases in excess of 100 psi. occurred toward the tighter, less-porous edge of the field where some resistance to fluid movement toward the edge of the field could be expected.

A definite relationship appeared to exist between the amount of pressure buildup during 1956 and the position of the producing wells relative to the injection wells. Generally speaking, producing wells adjacent to two or more injection wells showed greater pressure increases than producing wells adjacent only to a single injection well.

Fig. 7 shows that with one exception the greater pressure increases occurred in producing wells which were adjacent to two or more injection wells. The exception to this pressure reaction was Unit Well 70-3, which had the highest static pressure at the start of water flooding.

Data taken in April 1957 show that over-all pressure decreased slightly, from the May 1956 average of 778 psi. to 754 psi. This decrease is reasonable, since a balance between injection volumes and reservoir withdrawal volumes has been maintained during the initial flood program.

SARGENT

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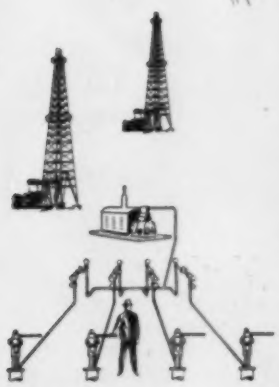

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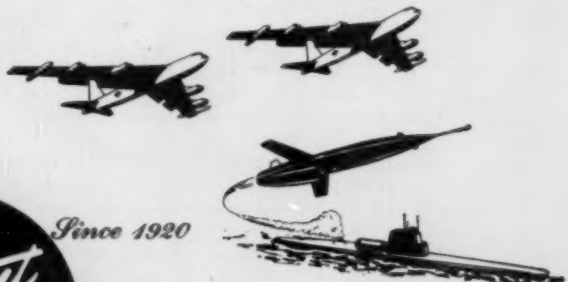

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G.O.R. down . . . The second reaction to water flooding has been in the form of production increases and producing gas-oil-ratio decreases. Intermittent flowing wells and conventional pumping wells are the two types of producing wells in the area.

Fig. 8 shows the producing history of the control well No. 78-1. This is considered a typical producing-well reaction to water flooding. The peak intermittent flowing gas-oil ratio was 12,000 cu. ft. per bbl. in May 1956. A steady decline then occurred through the year to the 2,000 ratio in December.

The relatively heavy flood-bank well fluid killed this well and subsequent swabbing operations failed to return it to a flowing status. Conventional pumping equipment was installed in November 1956. Subsequent pumping has resulted in substantial increase in daily oil production with producing ratios less than 2,000 cu. ft. per bbl.

Production rate has increased from 13 bbl. per day to approximately 100 bbl. per day. Gas-oil ratio has decreased to 550 cu. ft. per bbl. Water production, which started in January 1957, appears to have stabilized at 50 to 70 bbl. per day.

A total of six water-flood-area wells, numbered 78-1, 87-7, 80-1, 80-2, 81-1, and 81-3, have shown similar responses to water flooding. This is considered normal and it is felt that the upstructure, greater-porosity producing wells will be slower to show response to injected water. As of January 1, 1957, 6 of the 12 producing wells adjacent to the injection wells have been equipped with conventional pumping equipment.

Fig. 9 shows a summary production curve for the 12 producing wells adjacent to the 6 injection wells. A considerable effect in the area gas-oil ratio and the oil production can be noted.

1957 data . . . Production response of 10 wells (67-3, 70-1, 70-3, 70-5, 78-1, 78-7, 81-1, 81-3, 82-1, and 83-1) has been enhanced considerably by the water-flooding program. During February 1956 a total of 175 bbl. of oil per allowable day was produced from these 10 wells. As of July 1957, this total was 835 bbl. of oil per allowable day.

It is felt that current rate could be doubled within the next 12 months, since wells 67-3, 70-3, 70-5, 78-1, and 78-7 show promise of considerable additional water-flood response.

Water production for the 10 wells amounted to less than 200 bbl. per day as of July 1957, and G.O.R. was about 1,500 cu. ft. per bbl. on the same date.

Water-Flood Expansion

Additional evaluation time will be required prior to expansion of the pilot water-flood program. Early water-flooding results are considered very favorable and eventual full-scale water flooding for this 24,040-acre unit is considered very likely.

Indicated efficiency and effectiveness of the present pilot water flood will aid in determining the type of flooding program employed in this field. Relatively high injectivities have already shown that something other than a pattern flood can be used since the injection volumes are high enough to supply flooded oil for several producing wells per injection well.

A relatively high conformance factor and flood effectiveness could permit future full-scale operations through the best portion and least-depleted area of the field. On the other hand, a conformance factor of 50 per cent or less would, in all probability, direct the flooding program toward a "depletion-type flood" with water-flood operations in the lower pressure, more highly depleted primary area, while the higher pressure areas are allowed more time for primary pressure depletion. In this event, a peripheral line-drive flood would evolve.

Conformance Effects

Thick-section dolomite water flooding is affected by the conformance factor and the relative stage of depletion of primary production.

Based upon gas-injection-area performance and certain other similar limestone floods, it appears that the flood water will advance through certain zones of porosity but not all zones of porosity existing in this largely dolomitic lime. The zones through which the water advances can be expected to yield a maximum of 49.2 per cent of the stock-tank oil in place.

However, the zones which are not affected by the water flood but which are bypassed will remain at the same state of depletion at which they were at the start of water-flooding operations. In other words, if water flooding is initiated at 1,600 psi. in a given area, the primary recovery to this period would be approximately 9.8 per cent of stock-tank oil in place (Fig. 10). With 100 per cent conformance from water-flooding operations, this recovery could be increased to 49.2 per cent of the initial stock-tank oil in place.

With a 50 per cent conformance factor in a 1,600-psi. flood, total ultimate oil recovery would be 9.8 per cent of the 50 per cent nonconforming zone (produced prior to water flooding), plus 49.2 per cent of the 50 per cent conformance zone. This would be a total ultimate recovery of 29.5 per cent of the oil in place.

Effect of pressure . . . Certain additional factors must be considered in future full-scale water flooding for the Fullerton Clearfork Unit. It is assumed that negligible differences in saturations of oil following water flood will exist due to liquid characteristic changes of viscosity and capillary in the 1,600-psi. to 400-psi. reservoir-pressure range. However, with a given residual-oil saturation following water flooding, a difference in stock-tank-oil recovery will result due to the range of formation volume factors through this pressure range.

With a given residual-oil saturation, the greater the formation volume factor, the less stock-tank oil will remain in the reservoir. It has been calculated that 100 per cent effective water flooding will result in total ultimate oil recovery ranging from 41.1 per cent of the initial oil in place. Fig. 11 shows a comparison of the predicted primary ultimate oil recovery with 100 per cent effective water flooding started at various primary-depleted conditions.

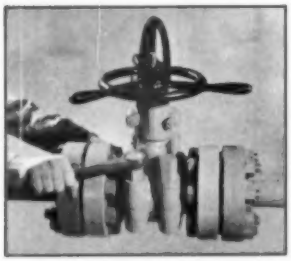
With less than 100 per cent effective water flooding the presumed lost primary production in the nonconformed sections becomes relatively important in programing full-scale flood program. Fig. 13 shows graphically the range of calculated oil recovery per acre with various conformance factors and with initiation of flood operations at 1,600-psi. reservoir pressure and 400-psi. reservoir pressure. These calculations are compared to the material-balance recovery estimate.

Conformance factors greater than 46 per cent will result in greater ultimate oil recovery from a higher pressure flood, but conformance factors less than 46 per cent will result in greater ultimate oil recovery with low-pressure flooding. The calculations for the curves presented in Fig. 12 were made on the basis that a flood started at 1,600 psi. would be abandoned at 1,600 psi. and consequently no additional oil recovery would be produced from the porosity zones which were bypassed by flood water.

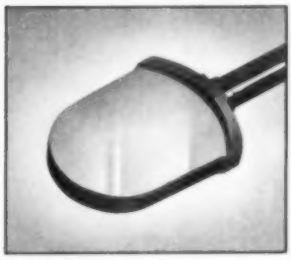
Acknowledgment

The authors appreciate the permission of Monterey Oil Co. to publish this paper.

WHY DO CAMERON FLEX-SEAL MUD VALVES OUTSELL ALL OTHERS?

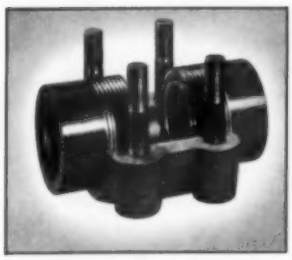


Extended cap nuts protect the all important stud threads from abrasion and corrosion, make bonnet removal extra easy in any position.



Gate and stem are one solid forging, give perfect alignment with no wobble to increase wear. The only mud valve gate with a shoulder —affords secondary energizing of packer. Rubber cannot flow past on tight closures.

Ballbearing stem nut on most sizes of the Type "R" affords easier operation, is interchangeable with Type "C" valves if Type "R" split bonnet is used.



Integral welded subs and body cap make misalignment during repairs impossible. If a sub is damaged it may be separated and replaced rather than replacing an expensive body unit.

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STAYS RIGID DURING REP

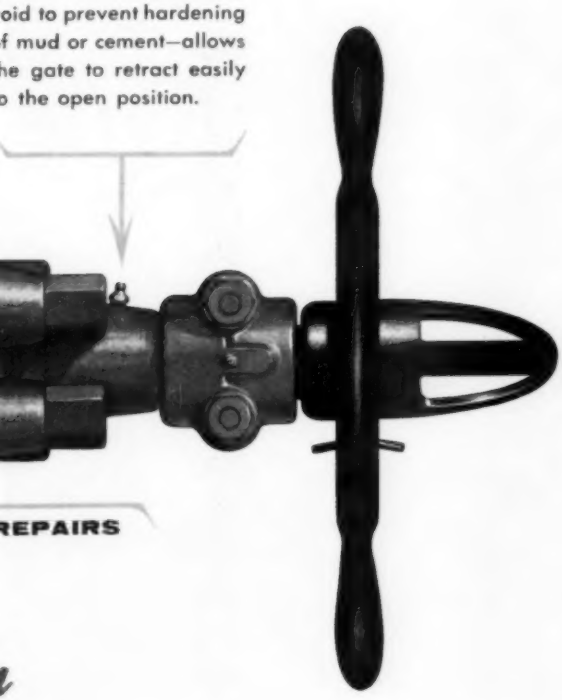
Cameron

TYPE "R" FLEX-SE

IT'S THE MUD VALVE WITH THE LONGEST WEAR AND THE EASIEST REPAIR

Tough new compound in the big gate packer means lots more wear, easier repairs. Replacements require no special instructions or fixtures—no intricate positioning of gate stem threads. The oversize carburized steel wear rings are sealed against the subs by "O" rings and are removed straight out with the gate packer as a unit.

lemite connection puts rease in the upper body oid to prevent hardening f mud or cement—allows he gate to retract easily o the open position.



REPAIRS

-SEAL MUD VALVES

IF YOU HAVE MADE A COMPARISON YOU KNOW WHY FLEX-SEALS OUTSELL ALL OTHER MUD VALVES

For twenty years the famous Cameron Type "C" Flex-Seal Mud Line Valve has been the favorite of the drilling industry. Its rugged dependability, low maintenance and economical repair have secured its place on most drilling rigs throughout the oil world. On the really tough jobs (formation fracturing, cementing, etc.), Cameron Flex-Seal Mud Valves are virtually standard equipment. For normal service also Flex-Seals have consistently outsold all other mud valves.

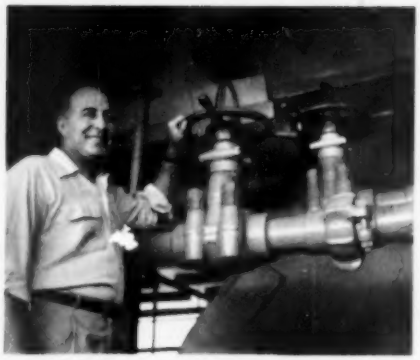
Now the Type "R" Flex-Seal is bringing even more benefits to operators in every oil producing area. The increasing use of rigid mud manifolds on drilling barges, unitized power rigs and service trucks for cementing and formation fracturing have indicated the need for this companion valve to the Type "C".

We suggest comparison — as a matter of fact, it is part of our design program. We believe that you will find as we have in our continuous laboratory and field tests that nothing can **actually** compare with Cameron's rugged Flex-Seal Mud Valves.

FLEX-SEAL

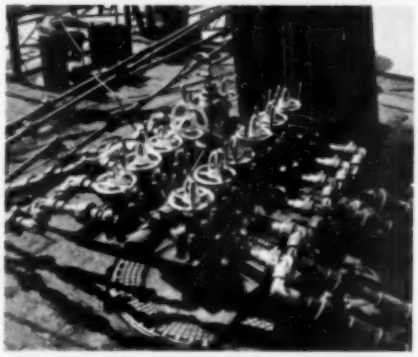
MUD VALVES HAVE PROVEN THEIR SUPERIORITY IN THESE SERVICES

Ideal for offshore installations, especially with welded hook-ups. The extra-thick wear plates protect the subs even with extreme negligence, if however a sub is damaged, it may be separated and replaced rather than replacing an entire body unit.

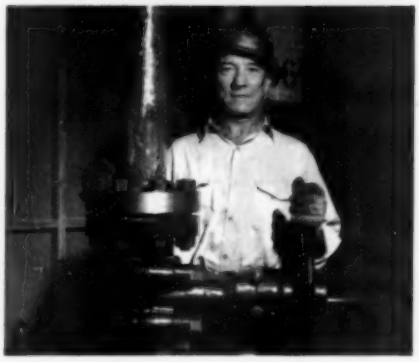


Flex-Seals have always handled the really tough jobs. This cementing manifold is typical of the highly abrasive services accurately and reliably controlled by the original Flex-Seal principle.

Probably the most destructive of all abrasive services is formation fracturing. The Flex-Seals in this manifold controlled 75,000 gallons of heavy sand-laden frac-fluid under 4800 psi injection pressure.



Type "R" Flex-Seals retain the outstanding advantages of the Flex-Seal design. Compare the Type "R" with anything offered today — we have designed much more wear resistance and far less repair effort into this new member of the famous Cameron Flex-Seal family, the driller's friend for almost 20 years.



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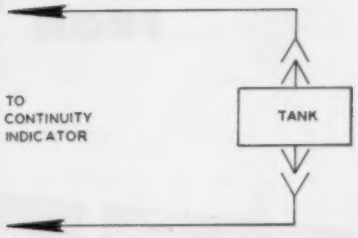
Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Title & Life Bldg., New Bond Street, London W. 1 England



SIMPLICITY OF PRINCIPLE marks the ground-checking device developed by Great Lakes Pipe Line Co. Fig. 1.

RUGGEDNESS OF CONSTRUCTION of the new device is apparent from the photograph at left. Fig. 2.

Here's a device designed to defang static electricity and provide for

Safer Loading-Rack Operations

at pipeline terminals

By C. H. Scruggs and D. L. Hope

ONE OF the hazards of petroleum product pipeline terminal operations is the possibility of explosion caused by discharge of static electricity in the vapor-laden atmosphere of the loading racks. As an initial step, all structures and fixed equipments are thoroughly grounded.

Into this area, however, are moved static-laden tank trucks and tank cars. The incidence of this movement is indicated by the fact that at the terminals of one large pipeline alone, over half a million tank trucks and more than 29,000 tank cars are loaded annually.

The percentage of charge-bearing tank trucks is indicated by some test results shown in Table 1. This figure indicates that slightly less than half of all trucks bear a static charge on entering the rack area. It further indicates that the incidence of charging decreases with increase of relative humidity.

Measured potentials . . . Of the trucks bearing static electricity entering the loading area, it is desirable to know approximately the percentage bearing

Authors are with Great Lakes Pipe Line Co., Kansas City, Mo. Paper presented at A.I.E.E. petroleum - electrical conference, Philadelphia.

TABLE 1—RESULTS OF TESTS TO DETERMINE INCIDENCE OF CHARGING

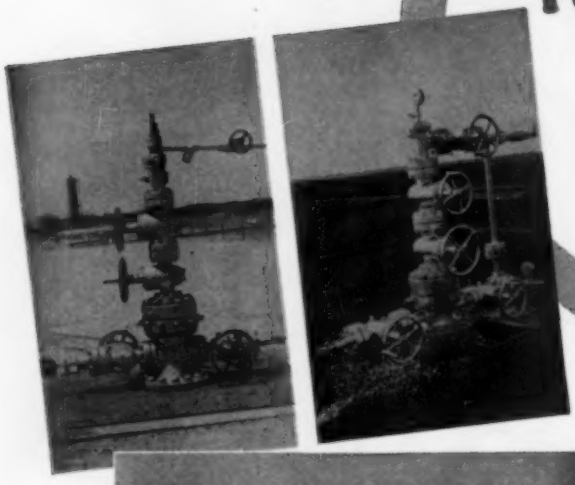
Date	Rel. hum., per cent Max.	Rel. hum., per cent Min.	Temp., °F. Max.	Temp., °F. Min.	Trucks Chgd.	Trucks Unchgd.
March 24	58	42	40	35	24	5
March 25	66	46	50	32	18	22
March 26	78	42	54	31	38	15
March 27	87	39	62	34	29	20
March 28	72	19	64	36	32	1
March 29	63	55	41	56	0	0
March 30	96	76	75	40	2	43
March 31	100	86	53	42	0	39

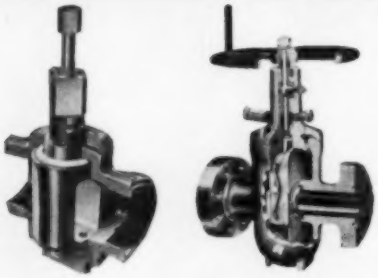
THESE TRUCKS HAD BEEN STANDING FOR SOME TIME AT THE OFFICE BEFORE ENTERING THE LOADING RACK.

TABLE 2—MEASURED CHARGING VOLTAGES

TRUCK NO.		REMARKS
1	50 VOLTS POSITIVE	TRUCK HAD NO CHAINS
2	200 VOLTS POSITIVE	TRUCK HAD ONE CHAIN; THE CHARGE REMAINED APPROXIMATELY 2 MINUTES
3	100 VOLTS NEGATIVE	
4	500 VOLTS POSITIVE AT 3:03 P.M. 200 VOLTS POSITIVE AT 3:10 P.M.	
5	300 VOLTS NEGATIVE AT 3:10 P.M. 200 VOLTS NEGATIVE AT 3:13 P.M.	
6	IN EXCESS OF 5,000 VOLTS POSITIVE AT 3:15 P.M.	

FROM W-K-M high PRESSURE and low PRESSURE valves





Here's wide range availability for both high and low pressure services from W-K-M.

For safe and positive high pressure control on christmas trees, flow wings, and flow lines, it's W-K-M Through-Conduit Gate Valves to handle working pressures from 500 to 15,000 psi.

For "expressway" turbulence-free flow in oil and gas pipelines, it's W-K-M ASA Through-Conduit Gate Valves from ASA 300 lbs. to ASA 1500 lbs.

For gathering lines, manifolds, headers and similar low pressure services, it's acf Lubricated Plug Valves—200 to 500 lbs. WOG.

You need dependability, performance, minimum maintenance! You need W-K-M and acf Valves, designed specifically to meet your requirements, in oilfield services, on pipelines, in refineries, in process and chemical plants, and wherever valves are required to control the flow of liquids or gases.

Complete your file of valve information by writing for these W-K-M Catalogs. Address Dept. A-1028

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W-K-M Catalog 300	W-K-M ASA Through-Conduit Gate Valves
W-K-M Catalog 400	ACF Lubricated Plug Valves
W-K-M Catalog 800	ACF Lubricated Manual

W-K-M

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a sparking potential. Table 2 indicates the results of a very perfunctory measurement of several trucks. Three of the six measurements indicated potentials of 300 volts or more.

The Bureau of Mines has made a number of tests and gives in its Report of Investigations 4833 the following information:

1. Lowest voltage at which static spark will jump in air—350 volts.

2. Oxygen mixtures of flammable gas have been ignited by a spark from a charge of 650 volts.

3. Air mixtures of flammable gas are not ignited when the sparking potential is less than about 2,200 volts.

From the somewhat incomplete tests of Table 2 and the foregoing, it would appear that the chance for accident is only 1 in 12, but when the frequency of loading (500,000 annually) and the extreme danger involved with explosions are considered, even this low possibility is far too great. For this reason, the grounding of tank trucks is an important safety consideration.

Single-wire grounding . . . For a number of years, a single wire grounding the tank has been used. This device has two important limitations:

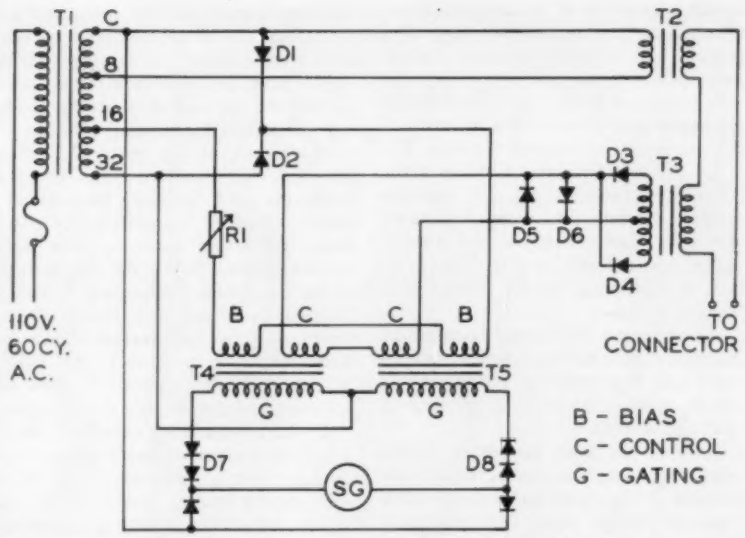
1. Good mechanical connection does not assure good electrical connection.

2. Single grounding provides no method of checking and monitoring connection.

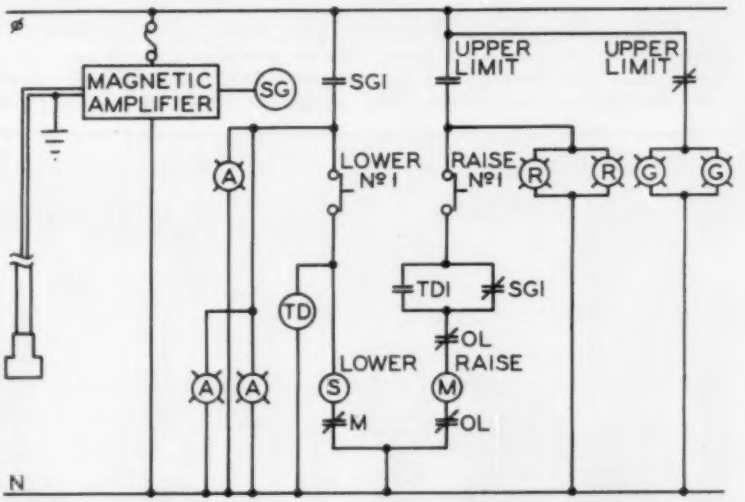
Several attempts were made to improve upon this device with its recognized limitations. Each operated on the principle of obtaining some indirect indication of the grounding connection utilizing vacuum-tube techniques and subjecting themselves to the limitations common to vacuum devices.

Recognizing that, in the final analysis, any ground checking device would have to evaluate the circuit resistance of the grounding connection, the design principle of the device under consideration started with that in mind. Fig. 1 indicates the simplicity of this principle. In essence, it is an automatically applied continuity checker connected across the grounding connection and the connection of its own test lead. It may be seen quite readily that if either the test junction or the grounding junction fail, indication of the ground connection will be removed.

Any device to be used in the loading rack would have to be enclosed in an explosionproof housing. Fig. 2 is a photograph of the equipment under discussion. Its ruggedness of construction is obvious.



GROUND CONTROL EQUIPMENT is connected as shown in this schematic diagram. Fig. 3.



SYSTEM OPERATION is illustrated in this diagram showing how the equipment fits into the loading scheme. Fig. 4.

Circuitry

A schematic drawing of the grounding control equipment is shown in Fig. 3.

Operation of the equipment consisting of power transformer, stepdown and stepup transformers T2 and T3, saturable reactors T4 and T5, and dry rectifiers is relatively straightforward.

Power-supply transformer T1 supplies 8 volts to the primary of T2, 16 volts, full wave rectified, to the bias winding, and 32 volts through the gating windings and rectifiers to the control relay winding.

Operation of the electrical equipment consists of applying 0.15 volt a.c. from T2 secondary to two grounding connectors on the tank. If both grounding connectors have continuity between them, current will flow through primary of T3.

The voltage produced in T3 secondary is rectified by D3 and D4, and this d.c. voltage is applied to the control winding of the saturable reactors causing the gating windings to conduct and deliver a voltage sufficiently large enough to operate the output relay through the rectifiers D7 and D8. Output relay contacts control alerting lamps and interlocks.

Magnetic amplifier . . . Use of magnetic amplifier principle amounts to controlling the impedance of gating windings and thereby the voltage delivered to the relay by means of sat-

urating the cores of T4 and T5 from current in the control winding. Opposing bias winding current effects must be overcome first, of course, and adjustment of bias resistor determines the value of current in the primary of T3 necessary to saturate T4 and T5.

Of particular interest is transformer T2 which produces only 0.15 volt regardless of any overvoltage whatever the input, amount, or source. This is important, for any large voltage present at this point would constitute a hazard in itself.

Further, the line voltage limitations normally imposed on magnetic amplifiers are bypassed by virtue of the on-off nature in which it is used in this application.

One of the most interesting points with regard to the device under discussion is the clever manner in which various voltage levels are physically isolated one from the other by means of a metal barrier. In addition, the test circuit is delivered through an explosionproof receptacle.

In operation, the device runs completely cold with only 2 watts of power consumption, thus insuring long life.

At the time of connection, the equipment evaluates the resistance in the circuit and if the resistance is not more than 5 ohms, the equipment will light a lamp and provide a circuit permitting the operator to lower the loading ramp into the loading position.

Movement of the material within the tank will generate static charges while the tank is being loaded and, therefore, the monitoring of the grounding system must continue during this period. While the application of the equipment to the system under discussion utilizes only visual (lamp) monitoring, no insurmountable problems would be present if the interlocking of loading operation valves or solonoid locking devices were desired.

In the system being described, however, the control of loading-ramp operation prior to grounding and visual alert during loading is considered sufficient. Further, in multiple loading racks, the economics of complex interlocking circuitry was not considered justifiable in the system under discussion.

Safety provision . . . Should either lamp burn out, the ground control equipment fail, or the grounding connector itself become detached, the extinguishing of the nearby monitoring lamp immediately notifies the rackman of grounding failure and his operating instructions require that he correct the defect before continuing loading operations.

Fig. 4 illustrates the application of the device in the system being discussed. Upon closing of circuit through connector, magnetic amplifier operates SG relay whose form "A" contacts complete the circuit to lamps "A" and permit "lower" push button to energize "S" lower relay, lowering the loading ramp.

On lowering, time relay TD contacts close and remain closed until 2 minutes after "lower" PB is released. After TD1 contacts release, "raise" PB is inoperative until grounding connector is removed, preventing the breaking of grounding cable resulting from failure to remove plug after completion of loading.

The success of the unit remains to be proved in reliability through the years. In favor of the unit presently, however, is the record of no explosions due to improper grounding due to static discharge.

Pump house, water filters, and water-storage tanks which will help add

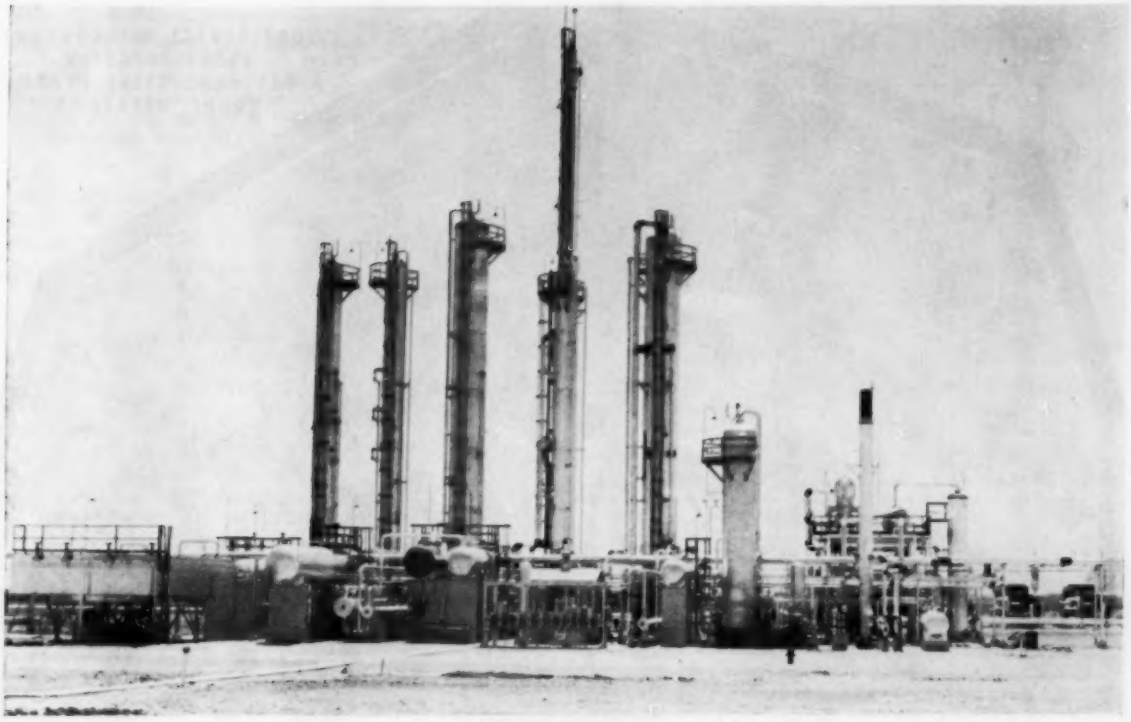
Million more barrels of oil in hot-water flood

SEVEN of the original wells have been worked over for use as injection wells at a 30-well water-flood project in Jones County, Texas. The wells average 4,600 ft. deep. A 5,800-ft. water well has also been drilled.

Known as the Ball-Keuhn Unit, the project covers approximately 1,187 acres and includes wells of 27 different operators. Production had dropped to an average of about 14 bbl. a day per well. When the project is completed, it is hoped the 22 wells kept as producers will give an output of an additional 1,000,000 bbl.

The equipment is designed to inject 6,000 bbl. of water daily, at 2,000 psi. Bottom-hole temperature in the water-supply well is 155°. Pumping is so rapid that the temperature is only 25° less at the pump suction.

The water is pumped from the supply well, through filters, into storage tanks and down into the seven injection wells by means of two triplex pumps, and are directly driven by two gas engines. Ceramic plungers are used with the corrosion-resistant pump fluid ends. Pumping equipment was furnished by National Supply Co.



Propane and butane produced here will be injected into producing formations

Continental Oil Co.'s new 60 M.M.s.c.f.d.

SHORT JUNCTION PLANT is a dual-system plant

This employed a low-temperature oil-absorption cycle with chilling furnished by ammonia refrigeration.

By John C. Reidel
Journal Staff

CONTINENTAL OIL CO.'S new Short Junction plant is located in Cleveland County, Oklahoma. It highlights at least a small trend developing toward the use of the combination refrigeration - oil absorption process cycle. This cycle provides the Short Junction plant with a high degree of flexibility. As the field is developed, the refrigeration system and the lean oil system can be operated to accommodate with ease changing gas composition while maintaining the desired extraction.

● Outdoor construction has been incorporated to a degree not ordinarily found in natural-gasoline plants. The use of packaged compressors on a large scale also contributes to the low initial cost of the Short Junction project. Contractor for this project was Tuloma Builders, Inc., of Tulsa.

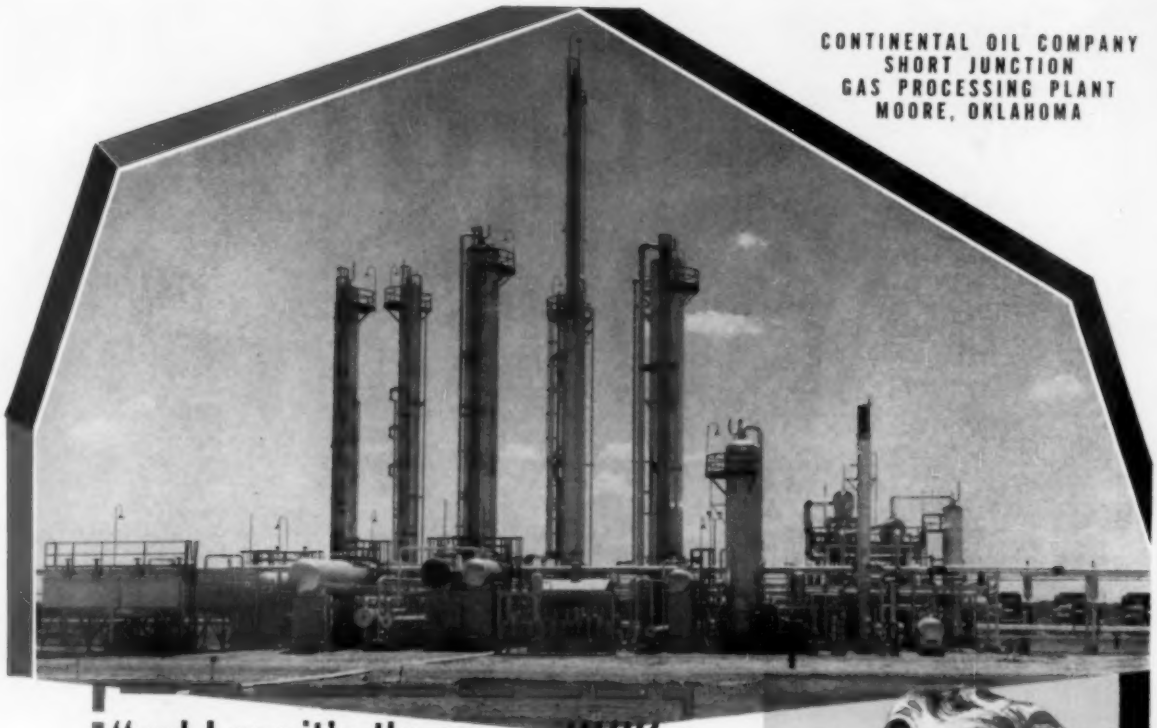
● At present the plant is handling about 30 M.M.s.c.f.d. But the design capacity is for 60 M.M.s.c.f.d. when Short Junction field is fully developed.

The propane and butane made by the Short Junction plant is to be injected into the Hunton lime in a 640-acre pilot L.P.G. injection project (OGJ, July 22, 1957, p. 50). It is planned to inject 100,000 bbl. into each well. Gas injection will follow L.P.G. injection. Enginering studies are being made to expand the flood to include all of Short Junction field. Short Junction is one of the important limestone reservoirs in Oklahoma and one which appears particularly suitable for L.P.G. injection. Geological history and data on the Bois d'Arc lime pay have been given by Barrett and Culp.[1]

An important aspect of the injection program is that it is being started early in the history of the field with the field pressure well above the critical of 1,900 psi. The plan is to obtain a miscible-phase sweep by slugging butane, propane, and natural gas, in that order, to the reservoir at a pressure of about 3,000 psi. Without injection the life of the field is estimated to be about 10 years. It is thought that with injection the life will be extended to 25 years.

The Short Junction plant facilities include:

1. **A 650-ton refrigeration** system which is used to chill: (1) the inlet



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"and I say it's the reason *WHY* that's important . . ."

. . . I say it's the reason *WHY* — and it's important. Tuloma has that almost indispensable ingredient — HONESTY. Add to that a raw integrity which companies like Continental depend on. Tuloma has the know-how — the men and the equipment.

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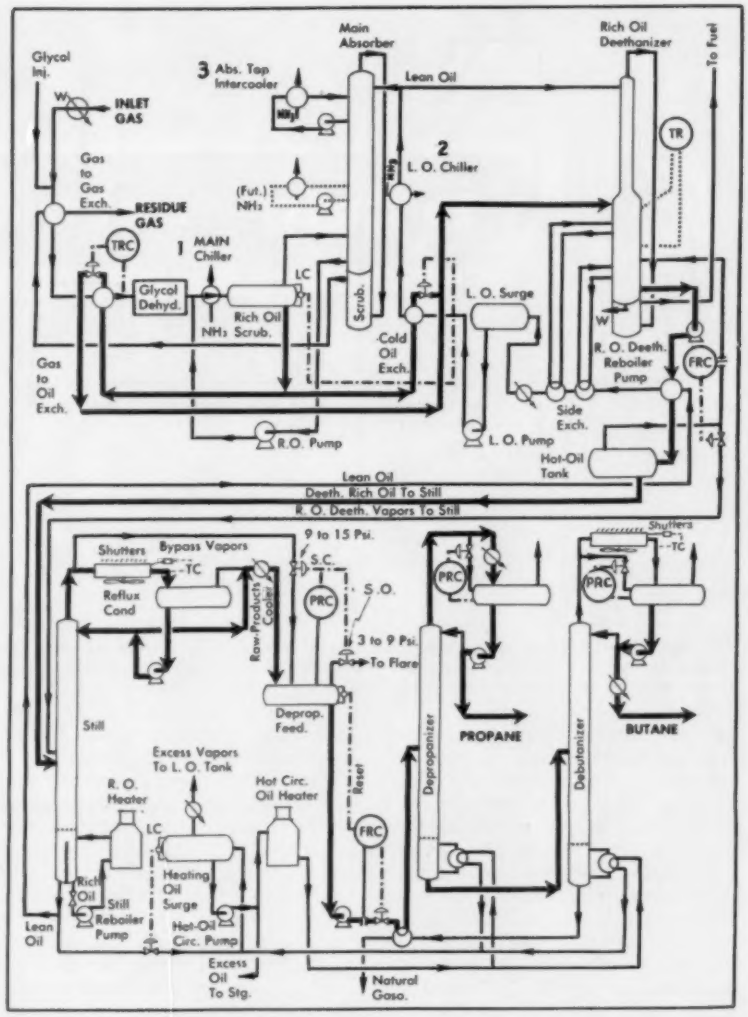
COMBINATION refrigeration - oil - absorption cycle is used at Continental Oil Co. Short Junction, Okla., gasoline plant. Refrigeration is used on: (1) main chiller (inlet gas and rich oil), (2) lean-oil chiller, and (3) absorber top intercooler. Fig. 1.



gas to the absorber, (2) the lean oil to the absorber, and (3) the absorber top intercooler. The rich oil from the bottom of the absorber is commingled with the inlet gas at a point upstream of the main (inlet gas) chiller. Some liquids are condensed from the gas as it is cooled. The rich oil also extracts some hydrocarbons from the inlet gas. These liquids, together with the rich oil, are separated from the gas in the absorber inlet scrubber and go on to the rich oil deethanizer.

2. **Side-stream interchanger heating** on the R.O. deethanizer. This type of cycle is used to obtain highest heat recovery. It results in a smaller R.O. deethanizer reboiler (which is actually a heat exchanger taking heat from the still bottoms). If side exchangers were not used, a direct-fired reboiler might have been necessary.

3. **Dry distillation** in the still operation. The plant does not employ any steam. One direct-fired heater is used to reboil still bottoms. A second direct-fired heater provides the heat, through a closed circulating hot-oil system, for the fractionator reboilers, etc. The heating medium is provided by the heavy ends from the lean oil cycle.

4. **The automatic safety shutdown system,** which is a normally deenergized system. There is only one major device in the system which is normally energized. This is an overriding device in the form of a low pressure shutdown on the instrument gas.

5. **Packaged compressors,** permitting a high degree of flexibility and making possible low-cost expansion to the anticipated ultimate gas-handling capacity of 60 M.M.s.c.f.d. At present eight compressors are in the plant, each with a capacity of 3 M.M.s.c.f.d. Additional skidded compressors can be installed with minor piping revisions. Eventually there may be a total of 30 compressors, including those used for gas injection into the reservoir.

Mannas[2] has discussed the advantages of using packaged compressors, especially for those fields with relatively short-life gas reserves. A company can build up a stock of packaged compressors which can be moved from one location to another as required. Field installation of a unit may be made at a cost as low as $5,000.

Additional processing flexibility and efficiency is obtained at Short Junction by the use of Nutter float-valve bubble trays in all columns except the ammonia column in the refrigeration section.

1. Short Junction processing . . . Inlet gas composition at Short Junction is as follows:

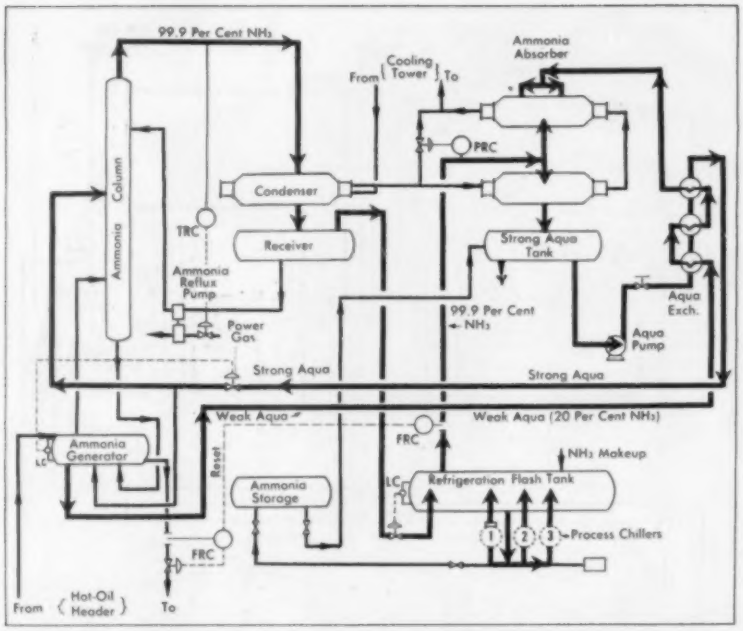
Component	Mole per cent
N_2	0.50
CO_2	0.42
C_1	74.60
C_2	13.72
C_3	6.47
i-C_4	0.70
n-C_4	1.97
i-C_5	0.38
n-C_5	0.54
C_6	0.38
C_7-plus	0.32
	100.00

The plant is designed to produce:

Product—	Gallons per day— Summer	Winter
C_3	52,400	69,900
C_4	49,500	49,800
12-lb. gasoline	38,900	38,900

Referring to the simplified process flow diagram, Fig. 1, the plant inlet gas from the compressor discharge is cooled in the compressor radiator sections, a water cooler, and then heat exchanged against residua gas. The inlet gas is further cooled by heat exchange with a portion of the rich oil from the absorber inlet scrubber. Glycol may be injected upstream of this exchanger train in winter to prevent formation in this part of the plant.

Glycol dehydration . . . A conventional diethylene glycol dehydration system is employed to reduce the dew point to 0° F. Condensed hydrocarbons from the bottom of the glycol absorber are routed to the R.O. deethanizer. The glycol regenerator employs hot oil for reboiling. An atmospheric-pressure condenser is built into the top of the glycol regenerator. This condenser consists of finned tubes welded into the tube sheet and uti-



REFRIGERATION SYSTEM is of the absorption (ammonia) type. This proved most economical for the Short Junction plant. The combination refrigeration-oil-absorption process scheme provides the natural-gasoline plant with greater processing flexibility. Fig. 2.

lizes natural air circulation to provide the required cooling. Note the temperature recording controller operating on inlet gas temperature at a point ahead of the glycol dehydration unit. The TRC controls that portion of the split flow coming from the absorber inlet scrubber and going through the gas-to-oil exchanger, to maintain an inlet gas temperature that will permit operation of the glycol contactor at 60° F. during the winter.

Absorption . . . The dehydrated inlet gas from the glycol contactor joins the rich oil from the bottom of the main absorber. The combined stream goes through the main chiller and into the absorber inlet scrubber. The low temperature in the scrubber (20° F.) and the presence of the rich oil leads to a combination of condensation and extraction of some of the heavier components in the inlet gas.

The absorber inlet scrubber thus acts as a contactor-separator ahead of the main absorber. And the liquids taken out by this means amount to an equivalent reduction in the inlet gas volume of about 5 to 6 per cent. The liquid from the inlet gas scrubber is split as indicated, with a portion going through the gas-to-oil exchanger and the remainder through the cold oil exchanger.

Operation of the absorber is at 230 to 325 psig., depending on the gas sales line pressure. Though the chilling of the inlet gas and lean oil and the cold provided by the top intercooler an average absorption temperature of 40° F. can be maintained.

R.O. deethanizer . . . This employs a cycle in which the heat requirements are supplied entirely by the hot lean oil stream. The heat is provided by a pump-around reboiler circuit (bottom exchanger and hot oil tank) and two sidestream interchangers. This type of R.O. rectifier cycle has been discussed by Ragatz.[3]

Side heater cycle advantages . . . These are: (1) more efficient lean oil cooling with less heat being dissipated by water cooling, (2) better vapor load distribution in the deethanizer stripping section, making it possible to decrease the tower diameter, and (3) better M.T.D.'s in the exchangers with less surface required and with saving in size of reboiler; there might be a bad temperature cross if all heat duty were put into one larger reboil exchanger.

A differential temperature recorder is provided for the stripping section of the R.O. deethanizer, with six thermowells located over the stripping section. This TR is to aid in establishing proper temperature gradient in the stripping section.

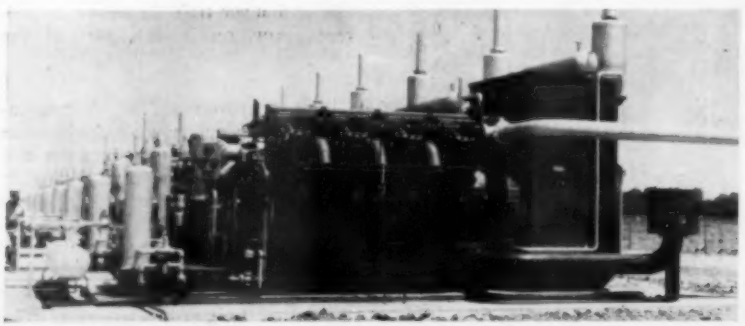
Still . . . This separates the deethanized rich oil into the raw gasoline and 140 M.W. absorption oil. The still is designed for about 60 per cent vaporization. Stripping with hydrocarbons is a more sensitive operation than stripping with steam; but no steam plant is required, no condensate recovery facilities, etc.[4,5]

A weir in the bottom of the still provides a head for the still reboiler pump, with lean oil on one side of the weir and rich oil on the other.

The direct-fired R.O. heater in the still reboiler circuit, with a duty of approximately 20,000,000 B.t.u. per hour, is one of the largest prefab heaters made.

Temperature in the still reflux tank is controlled by means of a temperature controller which, through a pneumatic operator, regulates the air fin condenser louvers. The fan is operated by a two-speed motor with the speed changed manually. Design calls for operation of the still reflux tank at essentially dew point conditions; "hot" reflux is employed and the product is subcooled. Water to the raw-product cooler is throttled to hold the depropanizer feed tank at design condition.

Hot-oil system . . . The heavy ends (heavier than lean oil) employed as a heat medium are charged into the system initially through the drain connection in the heating oil surge tank. Heavy ends present in the lean oil are pulled into the heating oil system, to provide makeup during operation, by flashing hot lean oil from the



PACKAGED COMPRESSORS with a common discharge header handle the gas at Short Junction. This is perhaps the largest installation of packaged compressors.

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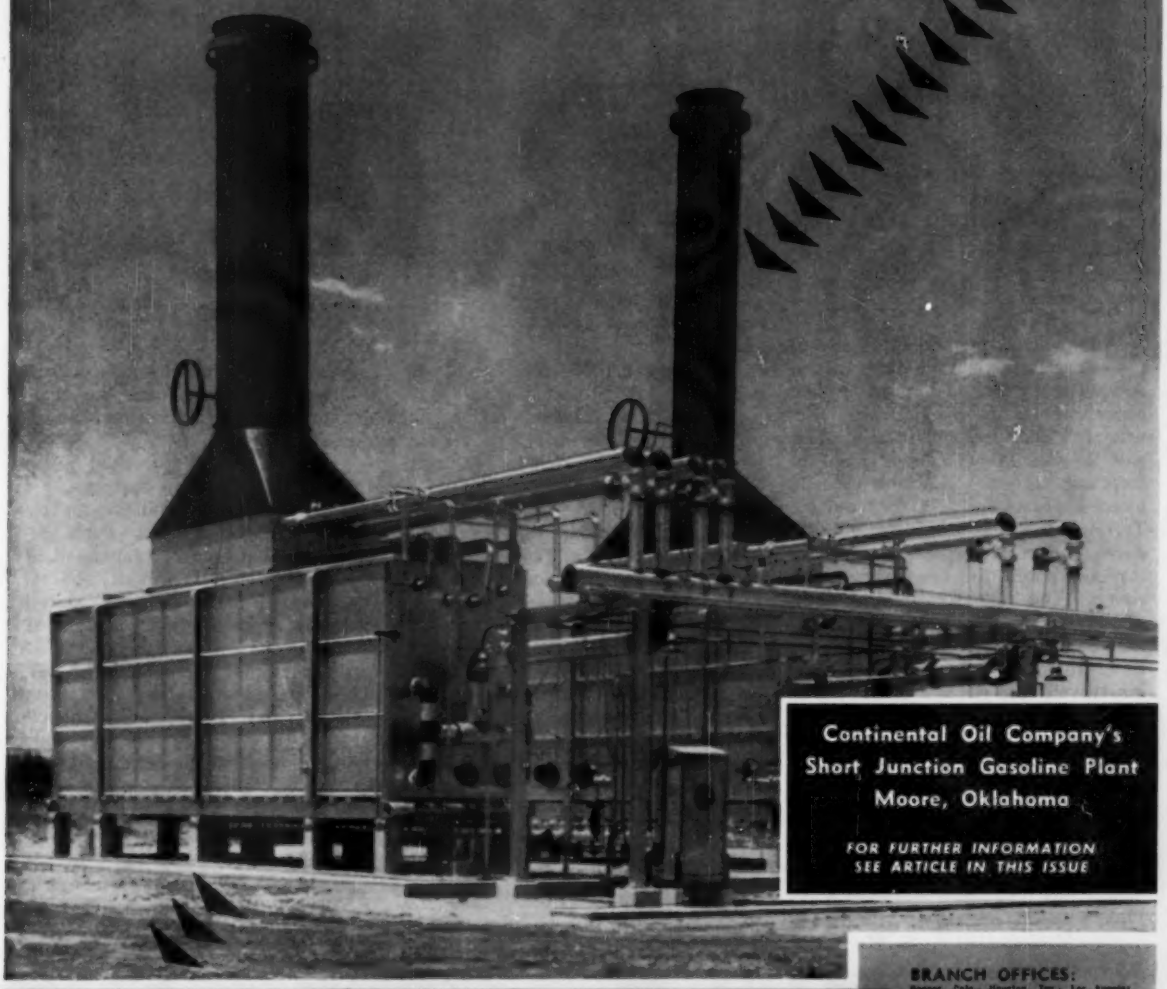

Continental Oil Company's
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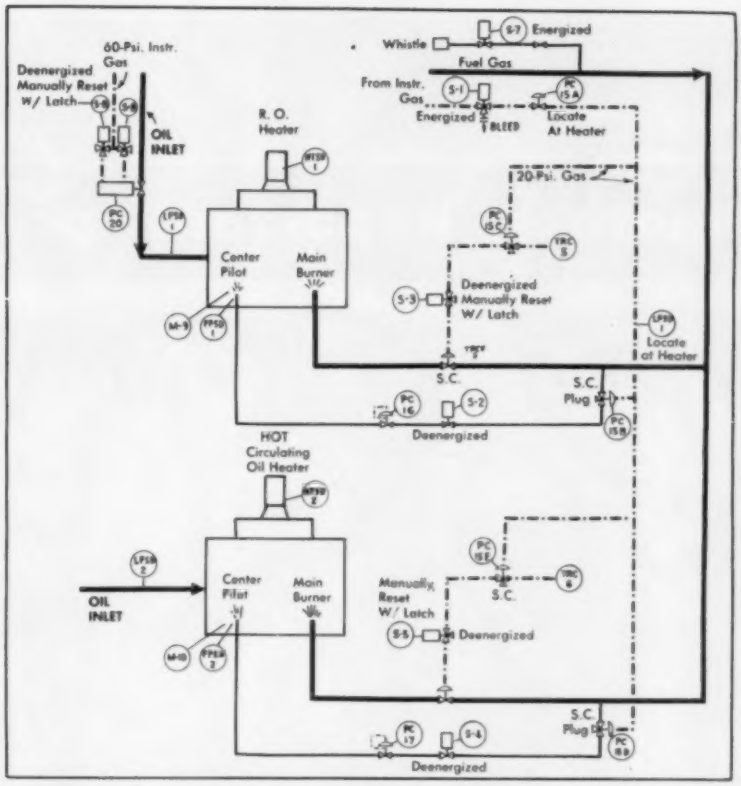
still into the heating oil surge tank. This is regulated by a level controller on the surge tank. Excess flash vapors are condensed and may be returned to the lean oil system or taken to storage.

Fractionation section . . . Still overhead vapor is bypassed around the still condenser and raw-product cooler to maintain control pressure on the depropanizer feed tank. A split-range control is employed with a sensitive PRC on the feed tank operating the spring-opening control valve (to flare) over the 3 to 8-psig. air output and the spring-closing valve (bypass vapors) over the 9 to 15-psig. output.

The fractionation section is designed to make propane and butane of 95 per cent purity. Reboil heat for the depropanizer and debutanizer are furnished by the hot circulating oil. The debutanizer employs an air fin condenser.

A cascade control is employed on the depropanizer feed, as indicated, to maintain the feed rate at production level.

Instrumentation . . . Only certain features of the control system have been shown in Fig. 1 and noted above. The balance of the instrumentation is largely conventional.



SAFETY SHUTDOWN SYSTEM schematic is shown here. The symbols M-9 and M-10 designate flame rods. Fig. 3.

2. Ammonia refrigeration . . . Absorption refrigeration is not a new process; and its recent use in natural-gasoline processing has been dealt with elsewhere.[6] That particular application was for the Tyrone, Okla., plant of Excelsior Oil Corp. The unit used by Excelsior is smaller (200-ton) and the Tyrone plant was originally built as a low-temperature separation plant (no oil absorption) for low propane recovery. The Short Junction process scheme, combining as it does ammonia refrigeration with oil absorption, provides the flexibility to handle a relatively lean gas and obtain higher propane recovery.

Flexibility . . . In a dual-system plant such as Short Junction, since the refrigeration system is separate from the lean-oil system, the two systems can be operated independently to get the desired extraction; either one of the systems can be shut down and the other operated by itself.

Why ammonia refrigeration? . . . Economic studies have been made comparing absorption refrigeration (ammonia) and mechanical (compression-expansion) refrigeration employing propane or Freon. The comparison of ammonia versus propane or Freon chilling must be made for each particular project under the conditions peculiar to that project. Thus a small (even a 50-ton) ammonia unit might prove more economical, in certain circumstances, for a rich gas. In other words, no generalization can be made as to the breakpoint—i.e., size of unit above which ammonia refrigeration is more economical.

When using absorption type of refrigeration instead of mechanical refrigeration we are going from vapor-phase to liquid-phase handling; in effect, we are swapping pumps for compressors. This leads to a lower maintenance cost for ammonia refrigeration. With an ammonia system, however, we are pumping more liquid and the energy input may be about the same as with mechanical refrigeration. Referring to Fig. 2, two pumping systems are employed in the ammonia refrigeration unit at Short Junction—the aqua pump and the ammonia reflux pump.

For the Short Junction installation the ammonia system showed up cheaper in initial cost than other refrigeration systems. Also, Continental Oil Co. has had experience with ammonia absorption refrigeration at its San Miguelito plant in Ventura County, California.

For the Short Junction installation a straight absorption oil system showed a higher utility cost than the combination oil absorption - ammonia refrigeration system.

Ammonia refrigeration system . . . Fig. 2 indicates how the 650-ton refrigeration plant operates. Pure ammonia (99.9 per cent) evaporated at 15 psig. and 0° F. provides the refrigeration. This ammonia is produced overhead in the ammonia column. A portion of the overhead is used to reflux the ammonia column. The balance flows to the refrigeration flash tank. The flash tank is located directly above the chillers. The ammonia flows by thermosiphon action through the three chillers. Ammonia vapor from the flash tank goes to the ammonia absorber. Here it is absorbed by a weak ammonia solution coming from the ammonia generator (ammonia column reboiler). Heat to this reboiler is supplied by heating oil. Cooling water, circulating through the tubes of the absorber, removes the heat of solution.

Absorption of the ammonia vapor results in a strong aqua solution which goes to the strong aqua (surge) tank. The strong aqua is preheated by weak aqua in the aqua exchanger then splits, a portion going to the generator

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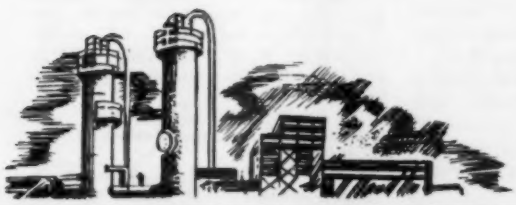

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OUTDOOR CONSTRUCTION is used to an unusual degree at Short Junction leading to a low initial cost for the project.

and the balance directly to the 10-tray ammonia column to make the 99.9 per cent ammonia overhead and a 20 per cent ammonia bottoms (weak aqua).

Control . . . The refrigeration-control system indicated in Fig. 2 indirectly regulates the back pressure on the refrigeration flash tank so as to maintain dehydrated gas, lean oil, and rich oil to the absorber intercooler at a constant temperature. The back pressure on the flash tank is regulated by a pressure controller, bypassing cooling water around the ammonia absorber so as to obtain a temperature in the absorber which will permit the circulated weak aqua to absorb the quantity of ammonia necessary for the desired back pressure.

The ammonia column has a top temperature control which regulates the rate of reflux and a constant heat input control on the reboiler which maintains a constant flow of heating oil to the reboiler. The heat input to the reboiler is reset by a flow rate controller on the flash vapors so that the heat input varies with the quantity of ammonia to be distilled to obtain the required refrigeration.

Effect of water in flash tank . . . If water gets into the refrigeration flash tank it will raise the temperature at which the ammonia boils. To hold the same refrigerant temperature, lower absorber and generator pressures would be necessary and this would reduce the system capacity and require more cooling water. An ammonia sump tank (not shown in Fig. 2) is provided and bleed lines lead from the flash tank and the three chillers to this sump. A small flow is always maintained through these bleed lines to avoid accumulation of water.

3. Automatic safety shutdown system . . . Low and high-level alarms which form part of the safety system at Short Junction are:

Low	Vessel	High
LLA-1	L.O. surge tank	HLA-4
LLA-2	Hot-oil surge tank	.....
LLA-3	Absorber inlet scrubber	HLA-2
.....	Absorber resid scrubber	HLA-3
.....	Deethanizer resid. scrubber	HLA-5
.....	Instrument gas receiver	HLA-6

Shutdown devices . . . The fuel flow, high temperature and low flow shutdown devices are indicated in Fig. 3. These devices are:

Rich-oil heater—FFSD-1, HTSD-1, and LFSD-1.

Hot-circulating-oil heater—FFSD-2, HTSD-2, and LFSD-2.

Both the main burner gas and the pilot gas are shut off at the respective heaters when any of the devices above are tripped. Three-way solenoid valves (S-3 in the line from TRC-5 to TRCV-5, and S-5 in the line from TRC-6 to TRCV-6) are used to bleed off instrument gas thus closing the control valves. Audible and visible alarms will operate when any of these SD devices are tripped.

Power failure . . . A time delay is used to hold the circuits open and allow time for the vacuum-tube amplifiers in the FFSD and HTSD devices to warm up. Pumps will continue running during this (5-second) delay.

To prevent heater shutdown during a power dip a restrictive orifice time delay is provided in the bleed port of S-1. This is coordinated with the push-button time delays on the pump motors.

When power failure extends beyond the 5-second period, all the pumps will stop. Then the heaters must be shut down. But the LFSD's are inoperable on power failure. This is where the normally energized three-way solenoid S-1 is employed. It bleeds instrument gas from four spring-closing valves—PC-15B and PC-15D on the center pilot gas lines to the heaters, and PC-15C and PC-15E in the instrument gas lines to TRCV-5 and TRCV-6.

Power restoration . . . In the case of shutdown due to prolonged power failure, LPSD-1 is provided in the instrument gas circuit to the four spring-closing valves mentioned above. On restoration of power LPSD-1 will trip and again deenergize S-1 to prevent fuel gas from going into the heaters. With LPSD-1 tripping, the bottom must be reset and held in until the one pilot in each heater equipped with the flame rod assembly (for fuel flow shutdown) goes on. Then S-3 and S-5 must be opened manually to get gas through TRCV-5 and TRCV-6.

When power failure occurs a whistle will sound. It can be silenced only by closing a hand valve in the small lateral line supplying gas to the whistle. In normal operation, this hand valve is sealed open with a car seal.

Three emergency shutdown buttons are provided. These are located at: (1) the plant office; (2) compressor area, and (3) process area. When pushed, these buttons shut down everything in the process area including the heaters.

Acknowledgment

R. G. Parker is regional manager of production for Continental Oil Co. at Oklahoma City, in charge of the Short Junction project. Appreciation is expressed to the following for the help given to the writer in preparation of this article: E. C. Mannas, regional superintendent of natural gasoline operations at Oklahoma City, Continental Oil Co.; and Guinn Williamson, Jack Gough, and Bill Robinson of Tuloma Builders, Tulsa.

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Natural-Gas Dehydration at the Gabe Ky., plant of T.G.T. got under way 5 years ago. Here's a report on operating experience at the plant

By A. G. Harrell

DEHYDRATION of 950,000 M.c.f. of natural gas daily for low-temperature extraction of hydrocarbons is a very important operation at the plant.

The entire gas stream is chilled to minus 105° F. at 530 psig. Upwards of 1,100,000 gal. of liquid hydrocarbons are recovered each 24 hours at this point. Two flash operations follow with reduction of pressure to 175 psig., then to 55 psig. Final liquid recovery after demethanizing is 440,000 gal. daily with a peak of 475,000 gal. of ethane and heavier hydrocarbons.

The residual gas stream at minus 105° F. is warmed by exchanging heat with the incoming gas, thence flows to compressors. Six 1,760-hp. and one 2,200-hp. (total 12,760 hp.) gas-driven units return the residual gas stream and first flash gas to T.G.T.'s main pipeline transmission system at 590 psig. The second flash gas is utilized as fuel.

A conventional ethane-propane cascade-type refrigeration system is employed to provide low-level refrigeration. Under this system, ethane is liquefied with propane refrigerant while propane is condensed with cooling water. Seven 1,760-hp. and one 2,200-hp. (total 14,520 hp.) gas-driven units process propane and ethane vapor through separate closed systems.

The author is plant superintendent of the Greensburg (Gabe), Ky., plant of Tennessee Gas Transmission Co. Paper presented at Texas A. & I. College, Kingsville, Tex., short course in gas technology.

Here are some significant figures . . .

Dehydration—Total of 950 M.M.c.f. processed daily. Water removal, from 7 lb. per M.M.c.f. to bone-dry steam. And 260 tons of desiccant in service.

Refrigeration—Entire gas stream chilled to —105° F.

Total Liquid Extraction—Upwards of 1,000,000 gal. of hydrocarbons daily before first and second flash gas operations and demethanization.

Final Liquid Recovery—Some 440,000 gal. daily of ethane and heavier hydrocarbons.

Compression—Thirteen 1,760-hp. and 2,200-hp. gas-driven compressors. Total horsepower requirements: 27,280 for processing and refrigeration.

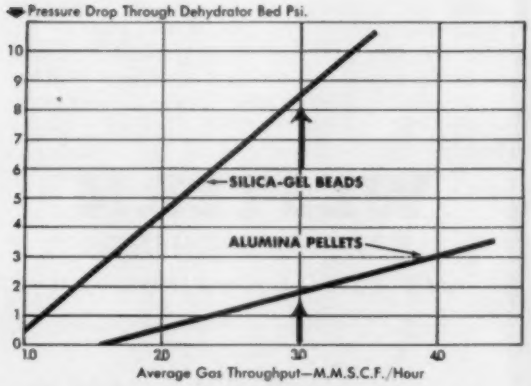
Electric Power—Developed with three 880-hp. gas engines driving three 750-kva. generators.

Dew-Point Requirements

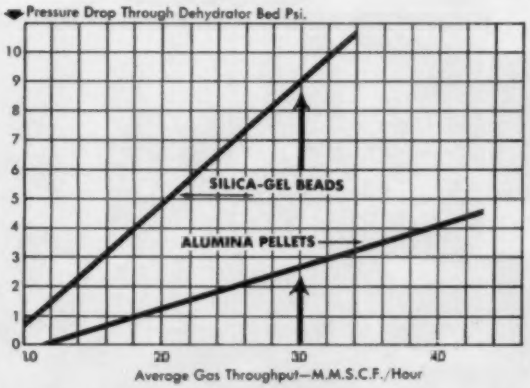
The incoming feed-gas stream to the plant contains a maximum of 7 lb. of water per million cubic feet at 72° F. and 570 psig. Since the entire stream is chilled to minus 105° F., all moisture must be removed to prevent icing of heat exchangers. This indeed is a difficult assignment and is a challenge to desiccant manufacturers.

Dehydration Installation

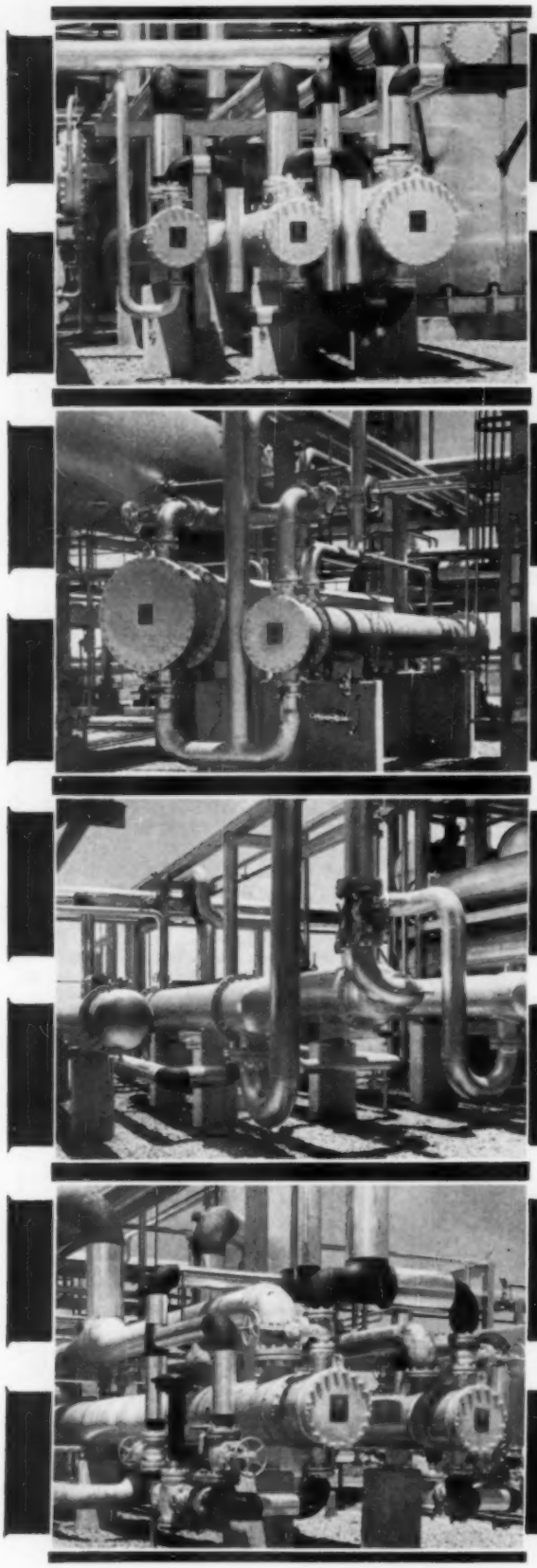
The plant feed wet-gas stream enters eight scrubbers with mist extractors to remove free water or other entrained liquids before entering the dryers. Sixteen dehydrators operating in parallel are provided to process the 950,000 M.c.f. daily. Fourteen are generally on stream at one time while



PRESSURE DROP COMPARISON with two desiccants 8 months old. Fig. 1.



PRESSURE DROP COMPARISON with two desiccants 18 month old. Fig. 2.



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- rich oil deethanizer reboiler
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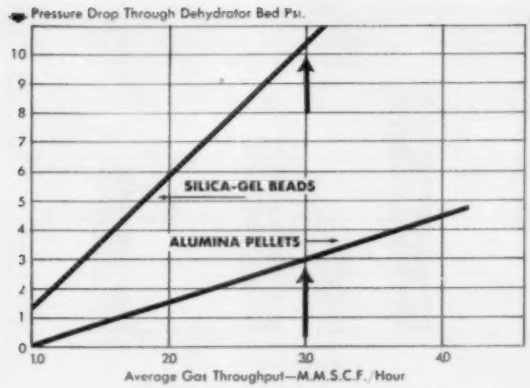
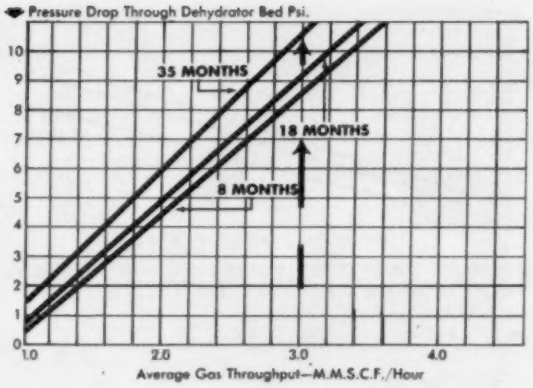


PRESSURE DROP COMPARISON with two desiccants 35 months old. Fig. 3.



PRESSURE DROP COMPARISON for silicagel beads after 8 months, and 35 months use. Fig. 4.

one is being reactivated and another cooling. Each dehydrator, 6 ft. 6 in. in diameter, contains a 20-ft.-deep bed of solid desiccant. Downflow of wet-gas stream through drying cycle provides for dry gas to depart from bottom section of dehydrators and enter common header. The dry gas is then divided into five metered streams flowing through the five trains of heat exchangers for chilling.

The reactivation gas stream is procured from upstream of dehydrators and flows parallel through two gas-fired vertical furnaces before entering a dehydrator for removal of adsorbed moisture and heavy hydrocarbons. The enriched stream then passes through heat exchangers to a separator. Gas from the separator enters compressors with residual gas from the trains and is transmitted to the main pipeline system. The water from separator is trapped off and liquid hydrocarbon is pumped into demethanizer bottoms stream.

The cooling-gas stream is also procured from upstream of dehydrators and removes heat from a reactivated bed then through heat exchangers to compressor suction for return to main pipeline system.

Experience With Various Desiccants

The first desiccant used was alumina granules, 4 to 8 mesh, with an apparent density of 50 lb. per cu. ft.

Activated bauxite was purchased later for trial service in a few towers. This desiccant was also 4 to 8 mesh and has an apparent density of 50 lb. per cu. ft.

Silica-gel bead has been and is presently in service as a desiccant in several towers. As a matter of fact, three dehydrator units have been in service 3 years and 8 months as of this date with this material 4 to 8 mesh, approximately 50 lb. per cu. ft.

Alumina pellet, 4 to 8 mesh, (52 to 55 lb. per cu. ft.) is in service in three towers. This desiccant (3 years' service) is still under observation.

Of the four above-mentioned desiccants, the latter two silica-gel bead and alumina pellet are considered most favorable to requirements of this operation at the moment.

A fifth desiccant, silica gel, 3 to 8 mesh, apparent density of 45 lb. per cu. ft., was recently installed in four towers. Observations and operational data will be recorded periodically to determine its efficiency.

It is interesting to note that approximately 260 tons of desiccant are required to charge the 16 dehydrators. For this reason, it is imperative to continually seek a material with higher per cent drying capacity resulting in less reactivation. The ideal desiccant has not been discovered as yet, from the standpoint of removing all moisture for several years of operation. Manufacturers, to fulfill industry demand, will continue to develop improved desiccants.

Superficial Velocities and Pressure Drops

The superficial velocity of the gas stream through the drying cycle varies from 35 to 40 ft. per minute depending whether 13 or 14 towers are operating concurrently.

Fig. 1 presents a comparison of silica-gel bead and alumina pellets after 8 months' installation. This graph indicates 8.5-psig. pressure drop through the silica-gel-bead bed, normal pressure, and flow rate 3 M.M.s.c.f. per hour. Under the same test conditions, 1.8-psig. pressure drop was observed on alumina pellet.

Fig. 2 again represents the same desiccant comparisons observed after 18 months in operation. The silica-gel bead pressure drop had increased to 9 psig. while alumina pellets increased to 2.6 psig. based on a similar test conditions as in Fig. 1.

Fig. 3 again represents the same desiccant comparisons after 35 months' operation. This time, silica-gel beads increased to 10.5 psig. while alumina pellets advanced to 2.9 psig.

Fig. 4 clearly demonstrates pressure drops on silica-gel bead under identical pressure, velocity, and flow rates of 3 M.M.s.c.f. per hour after 8 months', 18 months', and 35 months' operation.

Fig. 5 likewise represents identical data under same conditions of alumina pellets after 8 months', 18 months' and 35 months' operation.

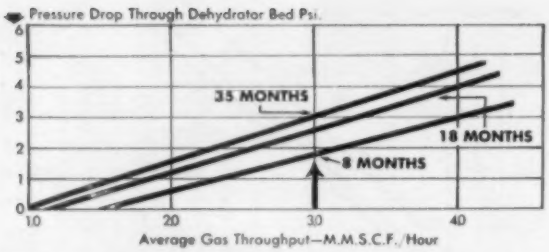
Decrease in Drying Capacities

Decrease in drying capacities of solid desiccants at Gabe plant has been rapid in the first few months of operation and then begins to level off as indicated on Fig. 6. This graph pictures an actual comparison of silica-gel bead and alumina pellets under identical operating conditions on drying capacities. Both desiccants had capacities of 7 per cent immediately after installation.

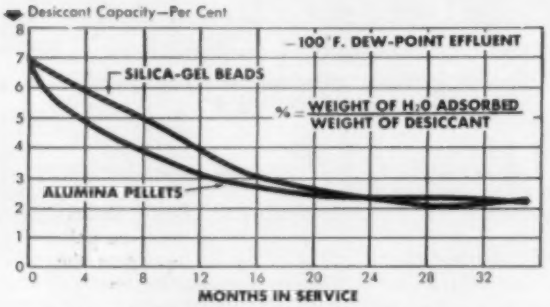
These observations are based on re-

DECREASE IN DRYING CAPACITIES OF DESICCANTS

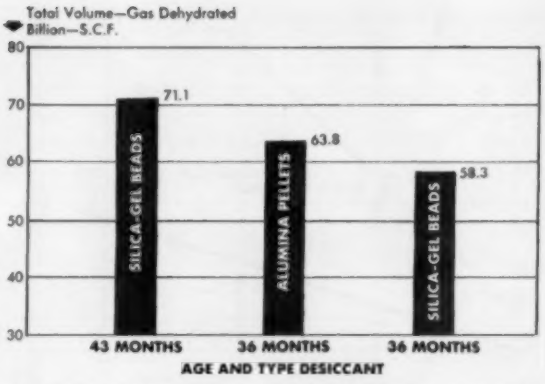
Age of desiccant in months:	Per cent capacity—Silica-gel beads	Per cent capacity—Alumina pellets	No. of reactivations—Silica-gel beads	No. of reactivations—Alumina pellets
0	7.0	7.0	1	1
8	5.0	3.9	145	145
18	2.7	2.5	272	283
27	2.0	2.2	425	436
35	2.2	2.1	587	598



PRESSURE DROP COMPARISON for alumina pellets after 8 months, 18 months, and 35 months use. Fig. 5.


Desiccant Capacity—Per Cent
100° F. DEW-POINT EFFLUENT
SILICA-GEL BEADS
% = WEIGHT OF H2O ADSORBED / WEIGHT OF DESICCANT
ALUMINA PELLETS
MONTHS IN SERVICE

DRY GAS CAPACITY—a comparison of silicagel beads with alumina pellets as functions of months in service. Fig. 6.



VOLUME CAPACITIES OF DESICCANTS vary considerably as shown by this comparison of silicagel beads with alumina pellets. Fig. 7.

"In general, analyses clearly indicated the major material causing contamination or fouling of the beds was heavy ends of light oil."

moval of 7 lb. of water per million cubic feet to a bone-dry stream. The acceleration of decrease in drying capacity is exceedingly high the first few months of operation, then begins to level off some. This demands a study of when to dispose of a desiccant, when to purchase, and what type to purchase.

Fig. 7 records volumes processed through the silica-gel bead and alumina pellets from time of installation to 3 full years of operation.

Reactivation and Cooling of Solid Desiccants

A stream of incoming gas flows parallel through two gas-fired furnaces and is heated to guarantee 400° F. at the bottom entrance of a dehydrator made ready for reactivation. The hot gas flows upward at a superficial velocity of 5.7 ft. per minute until 375° F. is observed at the top of desiccant bed. An average of 1,650 M.c.f. is required through a 4-hour cycle to drive the water and heavy hydrocarbon from the bed. Hot gas from reactivated bed exchanges heat with stream to furnaces. Even so, 10 M.c.f. per hour is required for fuel.

The cooling-gas stream enters at top of bed and flows downward at a superficial velocity of 7.6 ft. per minute. A 2-hour cooling cycle reduces the bed temperature at bottom of bed to 100° F. At this point, the bed is cool enough to return to drying service on feed stream. Necessary cooling for each cycle is produced by 1.1 M.M.c.f.

Pilot-Plant Operation

Full discussion of this subject could develop an interesting paper. Only major points are considered here.

Why fouling? . . . This investigation sought to learn what was fouling the desiccant beds, and a cheap way to prevent it. A small pilot plant composed of three test dehydrators and two precontactors was so designed that the dehydrators would nearly simulate the top one-third of the plant desiccant beds. This was done because this portion of the bed had fouled the most. Silica gel and bauxite were the only desiccants in service at the time so testing was confined to those materials. After numerous drying, reactivation, and cooling cycles, the test desiccants were removed and laboratory analyses followed.

Heavy ends . . . In general, analyses clearly indicated the major material causing contamination or fouling of the beds was heavy ends of light oil. The average molecular weight of the material removed from bauxite was 245 and from silica-gel beads 289. The extraction from bauxite contained 87 per cent paraffins, 12 per cent aromatics, and 1 per cent olefins. This indicated only 1 per cent of the material could readily be polymerized if proper conditions existed.

The effect of this oil is twofold. It not only blocks the pores of the desiccant, closing off channels for water to enter, but also covers the surface of the desiccant, making it more difficult for water to reach the desiccant surface. Adsorption rate is thus slowed. This fouling may also contribute to a slight increase in pressure drop through the beds.

At the time of pilot-plant investigation, Tennessee Gas Transmission used scrubber oil to scrub the incoming gas stream to most of the compressor stations. Since several of the stations are upstream of Gabe plant, a minute quantity of scrubber oil as well as lubricating oil is carried in the gas stream. The intake scrubbers at Gabe cannot remove all of it, therefore, after processing several billion cubic feet of gas, a certain amount of fouling of the desiccant is to be expected. Normal reactivation temperatures only remove part of the oil. The use of scrubber oil is no longer necessary at most stations so the problem has been partially eliminated during the past 2½ years.

Other samples procured from compressor valves containing deposits were observed. Much of this foreign matter was found to be bauxite. Dust from the bauxite was carried by the gas stream through the trains of exchangers and into the compressor cylinders. Some of it remained in the exchangers, thereby decreasing heat-exchange efficiency. Excess wear in compressor cylinders was also observed. **End.**

UNMATCHED PRODUCTION FACILITIES, plus 15 years of helicopter experience, stand behind every Sikorsky helicopter. Shown above is a part of the S-58 assembly line. S-58s can easily carry two-ton loads.

First in Helicopter Know-how for the Oil Industry

SIKORSKY S-58 (above) in offshore oil operations can fly 12 passengers 125 miles offshore and return without refueling. In the Gulf of Mexico area alone, S-58s and 7-place S-55s are carrying more than 27,000 passengers a month. Sikorsky helicopters have been in scheduled operations about four years on the Gulf.

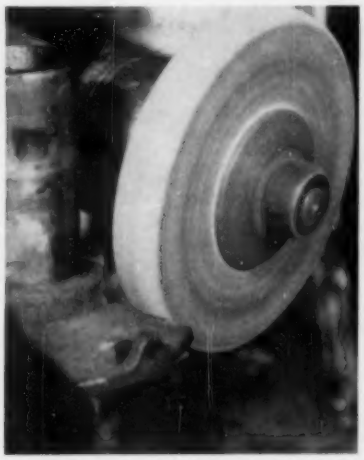
Sikorsky helicopters have been rolling from assembly lines in Connecticut for nearly 15 years. They have proved their usefulness to the oil industry and to other industrial and commercial operators, to the airlines, and to the military services of almost the entire free world.

The leadership which Sikorsky Aircraft has won in helicopters is based on a record of continuous design, development, and production unequalled in the industry . . . and on comprehensive research, test and production facilities. In the world's largest helicopter plant in Stratford, Connecticut, and in another large plant in Bridgeport, three outstanding models of transport helicopters are currently in quantity production—7-passenger S-55s, 12-passenger S-58s, and 26-passenger S-56s.

As a result of outstanding experience and facilities, Sikorsky helicopters are unmatched in their ability to serve the oil industry. If your problem involves moving men or materials offshore, or over difficult terrain, write for more information on how well Sikorskys can do the job.

SIKORSKY AIRCRAFT
STRATFORD, CONNECTICUT
One of the Divisions of United Aircraft Corporation

TRANSMISSION main-drive-gear retainer that cracked in service.



FIRST STEP in brazing was to grind the break to a V of 90° and then clean.

PART was laid face up. Actual brazing began with preheating the break.

How to Braze Cast Iron

A MIDWESTERN company has specialized in the repair of broken and cracked cast-iron machinery for the past 12 years. The fifteen operators, who do the repairs for this company, have performed major jobs from coast to coast, and in Canada and Mexico.

These operators don't always follow the book when it comes to braze-welding and welding preparations. For example, their methods in the matter of joint preparation and preheating are unusual. Instead of a deep vee for braze-welded joints, the castings are prepared by scooping out a shallow "U." This joint preparation has been found to be at least as effective as the normal vee.

No preheating . . . The methods used in preheating are also unusual. These braze-welding specialists disagree with the belief that the very nature of cast iron requires elaborate preheating before making repairs of cracks and breaks. They have performed hundreds of repairs on cast iron without preheating before braze-welding. By eliminating the preheating, it has been possible to avoid a great deal of dismantling; preheating ovens are not needed; and the elimination of preheating reduces distortion that would require machining.

Several techniques have allowed these operators to eliminate preheating. First, they control stresses by using the proper welding procedure, being especially careful to have as near perfect a bond as possible. The men are trained to spend the necessary amount of time on each square inch of weld to make certain that there is no possibility of a small spot not being properly bonded. Any such small spot in which the bond was missed may mean a secondary crack in the base metal.

Another technique employed by this company's operators is to break up the long straight stress lines by short welds across the line of the repair.

In addition to producing an irregular stress line, these extra bronze deposits serve to reinforce the narrower braze-weld.

In every welding job, the bronze deposit is ground down to original surface. This means that there is no reinforcing bronze metal on the completed job. In grinding off this excess, a thin surface of bronze deposit is removed. This deposit is brittle and apt to cause trouble in the future. During the welding, the operators weld only short distances that can be handled easily.

Safety precautions . . . Although the techniques that they use may be called unorthodox, these operators don't swerve from normal when it comes to safety. Their safety precautions are carried out as would be done in welding in temporary locations in industrial plants. In line with that policy, atmospheric gas tests are made to determine the composition of the air around the welding area. Combustible materials must be removed from the welding area. Fireproof screens, to prevent sparks from reaching nearby locations, are often erected. Oil pools near welding jobs must be cleaned up, and provisions for fire extinguishing equipment is made. In especially hazardous locations fire watchers are employed.

Many important industrial organizations call upon this cast-iron-repair company for reclamation jobs, because they know that the cost of braze-welded repairs is going to be much lower than the cost of new equipment, and the completed job will give just as good service as would a new part. And—braze-welding comes to the rescue in repair of machinery for which replacement parts aren't available.

BOLT HOLES had to be redrilled but total cost of repair was much less than a new retainer.

Article reprinted from Linde Tips, Vol. 34.

Here's Refrigeration Designed For Every Basic Oilfield Application!

...It's The New BS&B "COLD-FRAC*" Ammonia Absorption Refrigeration Unit

OUTSTANDING FEATURES:

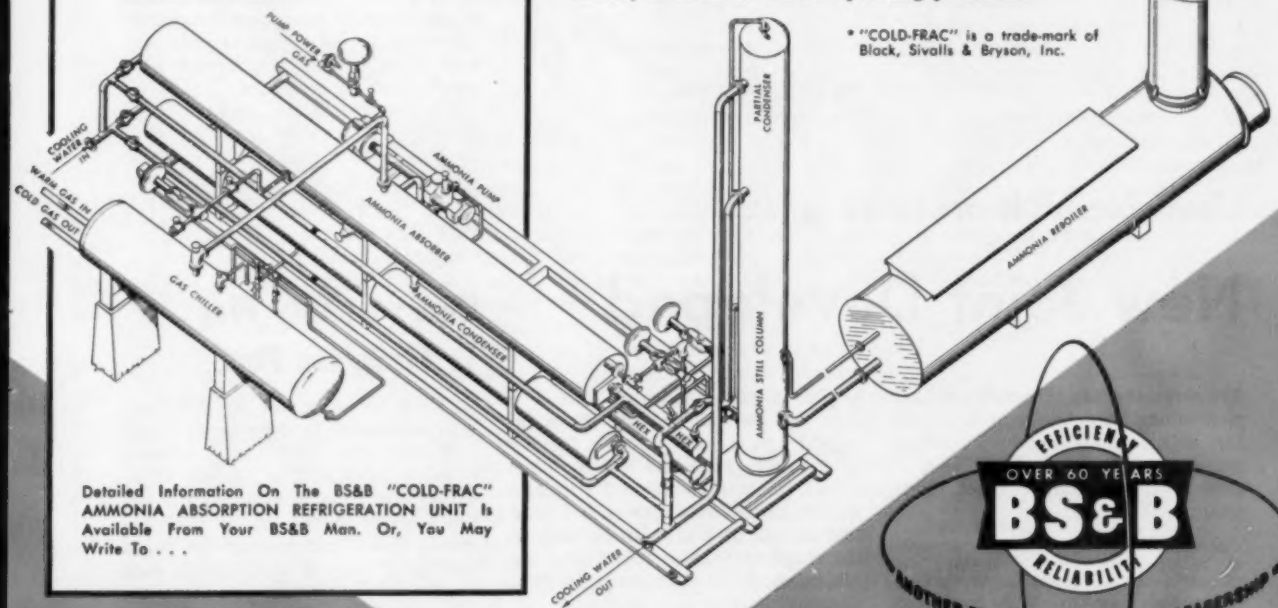
1. **Entirely Self-Operating.** Automatically Adjusts to Load Changes.
2. **Low Initial Cost.** Unit May Be Skid-Mounted Except Ammonia Reboiler. Outside Construction — No Buildings Required.
3. **Low Cost Maintenance.** Liquid Pump Is The Only Moving Part.
4. **Operating Costs Vary.** In Direct Proportion To The Load.
5. **Lower Operating Temperatures** Do Not Materially Decrease Capacity.
6. **Completely Closed System.**
7. **Chiller "Slop Over" Of Liquid Refrigerant Causes No Problem.** (There is no compressor to cause worry about liquids in the suction.)
8. **Oil Lubrication Eliminated.** No Oil-Refrigerant Problem.
9. **Vibration Free.** No High Speed Reciprocating Machinery To Mount.
10. **Experts Are Not Required** To Operate and Maintain The Unit.

With the development of BS&B's new "COLD-FRAC" AMMONIA ABSORPTION REFRIGERATION Unit, the oil industry now has a simple, non-mechanical, heavy duty artificial refrigeration system which is applicable to any oilfield or refining process requiring temperatures below ordinary atmospheric level.

A few examples of immediate industry applications are:

1. **Gas Pipeline Companies — For The Elimination Of Liquids In Gas Transmission Lines Through Better Hydrocarbon Dewpoint Control.**
2. **Gasoline Plants — For The Chilling Of Absorption Oil To Increase Hydrocarbon Recoveries Without Installing Larger Absorption Oil Towers Or Pumps.**
3. **Lease Production — To Provide Essential Refrigeration For Maximum Hydrocarbon Recovery Where Sufficient Pressure Expansion Is Not Available. Also To Supplement Declining "Natural" Refrigeration.**

These Ammonia Absorption Refrigeration Units are built for rugged, heavy duty, 365 day-per-year continuous operation, and are available in eleven standard sizes. Completely automatic in operation, they are equipped with BS&B oilfield-type controls and motor valves which are already familiar to oilfield operating personnel.



* "COLD-FRAC" is a trade-mark of Black, Sivalls & Bryson, Inc.

Detailed Information On The BS&B "COLD-FRAC" AMMONIA ABSORPTION REFRIGERATION UNIT Is Available From Your BS&B Man. Or, You May Write To . . .

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ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

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Oilfield Equipment Division, Dept. 1-A108

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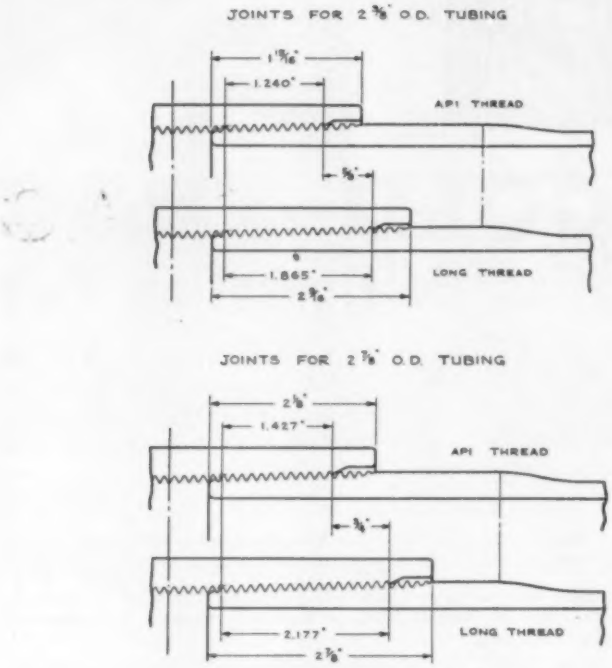
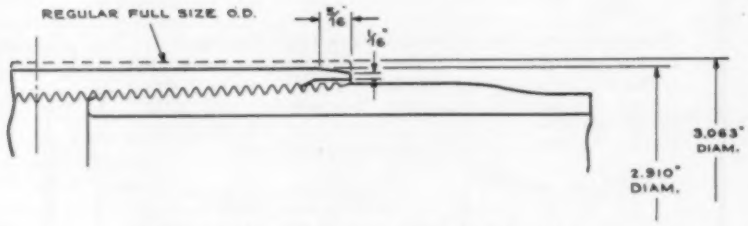


COMPARISON of joint designs.



SPECIAL-CLEARANCE joint for 2⅜-in. o.d. tubing.

Used for high-pressure gas . . .

New Joint Developed

AN external-upset threaded and coupled tubing joint has been developed for high-pressure-gas service where pressures may exceed the capacity of present A.P.I. external-upset tubing joints.

Information presented in "Development of Tubing Joints for High-Pressure Gas Service" by W. M. Frame and W. F. Franz of National Tube Div., U. S. Steel Corp., Pittsburgh, Pa. Paper was presented at midyear committee conference of the A.P.I. Division of Production, Kansas City, Mo.

The A.P.I. round-form thread is used and the joint is applied on the regular upset ends. Specific features of the design are the use of closer thread tolerances than A.P.I., longer thread length than the A.P.I. joint, and the use of a heavy tin plating on the coupling threads. Joints have performance of the joint design to be as follows:

1. Using a relatively low-power makeup (900 ft.-lb.) the joint is leak-tight with an internal nitrogen gas pressure of 15,000 psi., and 100 temperature cycles between 60°-200° F.

2. The joint is capable of withstanding 12 repeated makeups and breaks at constant makeup torque (which is sufficient for a leak-tight joint) without thread damage, and is gas-leak-tight after the thirteenth makeup.

3. The power makeup required for a leak-tight joint is 2¼ turns or 900 ft.-lb. of torque for both the 2⅜ and 2⅞-in. tubing joints. This torque is about one-third to one-half of the torque required for a comparable joint using zinc-plated coupling threads.

4. The 2⅜-in. tubing joint can be made with a reduced coupling diameter of 2.910 in. without changing the torque required for a gas-leak-tight joint and can be made up repeatedly. In this case the coupling is made of the next higher grade of steel than the tubing.

5. The tensile strength of the joint is not altered by the use of the low-friction tin on the coupling threads.

The new long-thread designs are the same as for the A.P.I. joints except that the thread length is ⅝ in. longer for the 2⅜-in. o.d. tubing and ¾ in. longer for the 2⅞-in. o.d. tubing joint.

The special-clearance joint is identical with the long 2⅜-in. high-pressure tubing-joint design except that the coupling o.d. has been reduced from 3.063 to 2.910 in. and the outside ends of the coupling have been beveled to allow two tubing strings to slide past each other without interference with the faces of the couplings.

The regular A.P.I. external-upset threaded end can be made up with the long-thread coupling, but of course the long-thread tubing end could not be made up with a regular A.P.I. coupling.

Here's an Easy Way To Straighten Pipe

HERE'S an easy way to straighten bent pipe, or make slight bends where you want them. Weld ¼-in. steel plate to the ends of a 20-in. I-beam. Then, cut 1½-in. holes in each plate at the same height as the top of your hydraulic jack. You can get the bends out "cold," or use one hand to hold your blowpipe while you heat the pipe. The jack can be operated easily with one hand.

Reprinted from Linde Tips, Vol. 34.

Laboratory Testing

JOB IMPROVEMENT FOR THE PROCESS FOREMAN—106

Finished-Product Testing Methods

MANY tests, although they are in common use for finished products, have a limited use in unit operations. The following tests will be discussed briefly in the remainder of this series:

1. Aniline point.
2. Burning test.
3. Carbon residue.
4. Cetane number.
5. Cloud and pour point.
6. Copper number.
7. Corrosion.
8. Diesel index.
9. Doctor test.
10. Ductility.
11. Emulsion test.
12. Explosivity test.
13. Gas analysis.
14. Gum test.
15. Melting point.
16. Mercury number.
17. Mooney viscosity.
18. Octane number.
19. Penetration.
20. Softening point.
21. Sulfur-lamp method.
22. Water and sediment.

1. Aniline point . . . This is the lowest temperature at which a volume of oil will mix with an equal volume of aniline to form a clear solution. An aniline point around 0° F. indicates a very high aromatic hydrocarbon content while an aniline point of 100° F. or above indicates a very high paraffin hydrocarbon content. This information is useful in determining the solvent qualities of naphthas and the cracking qualities of feed stocks.

2. Burning test . . . This lamp test shows the burning qualities of kerosine. The A.S.T.M. lamp test consists of burning a measured amount of kerosine in a test lamp for 24 hours. The wick is trimmed and the flame set to exact dimensions at the beginning of the test. A comparison of the condition of the chimney, wick, and flame at the end of the test to that at the beginning is made and the amount of kerosine burned is measured.

3. Carbon residue . . . This is a measure of the carbon-forming tendency of an oil when exposed to high temperatures. This information is useful in cracking operations, domestic-fuel-oil problems, and lubrication problems.

This test consists of heating a weighed sample of oil to drive off the vapor then continuing to heat the residue until it is a hard dry coke. The carbon residue is the weight of coke after heating referred to the weight of the oil, expressed in per cent.

4. Cetane number . . . These are used to classify diesel fuels. To determine a cetane number on a sample of diesel fuel, two standard fuels are used. One is a very good fuel called cetane; the other is a very poor fuel called methyl naphthalene. These two fuels can be mixed together to match any sample of diesel fuel when compared in a diesel-fuel test engine. The percentage of cetane in the mixture of the two standard fuels that matches the test sample is called the cetane number of the test sample. A cetane number of 100, therefore, indicates a very good diesel fuel.

5. Cloud and pour point . . . The pour test is useful in that it reveals the temperature below which an oil will not flow, lubricate, or pump.

When a sample of oil is cooled down and viewed through a glass jar, a cloudiness will form in the oil. The temperature at which the cloud first appears is called the cloud point.

The pour point is determined by cooling a sample of oil in a glass jar at a specified rate and observing the sample at each 5° F. interval by tilting the jar. The pour point is recorded as 5° F. above the solid point.

6. Copper number . . . This is a measure of the amount of sulfur compounds called mercaptans, present in an untreated naphtha. Some stocks are almost doctor sweet and have copper numbers less than ½. Other stocks smell very foul and have copper numbers of 20 or 30 or higher. The copper-number test is a chemical analysis made in the laboratory and is very useful as a control test in treating naphthas.

7. Corrosion . . . Corrosive materials in light oils will attack the working parts and fuel systems of engines and the oil-storage facilities. The copper-strip corrosion test is a method to determine the presence of corrosive sulfur in a test sample of oil. A copper strip which is cleaned and polished is placed in the sample of oil at a controlled temperature for a specific length of time. The tarnish formed on the strip is compared to standard test strips which classify the strips from a perfect strip to a black strip.

This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso-Standard Oil Co.

The First Six Parts . . .

Part 1—August 26, p. 128
Part 2—September 9, p. 119
Part 3—September 16, p. 235
Part 4—September 23, p. 129
Part 5—October 14, p. 226
Part 6—October 21, p. 132

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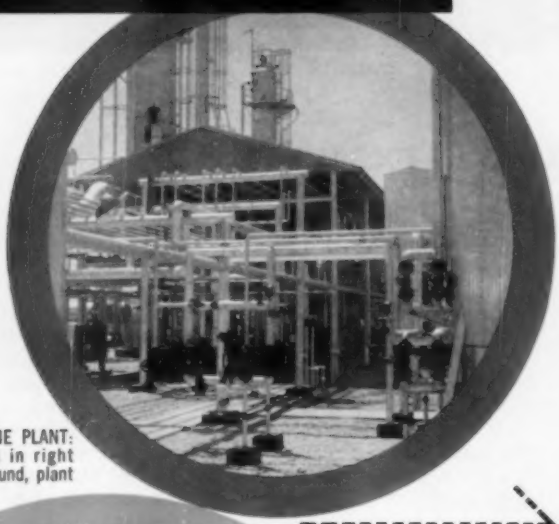
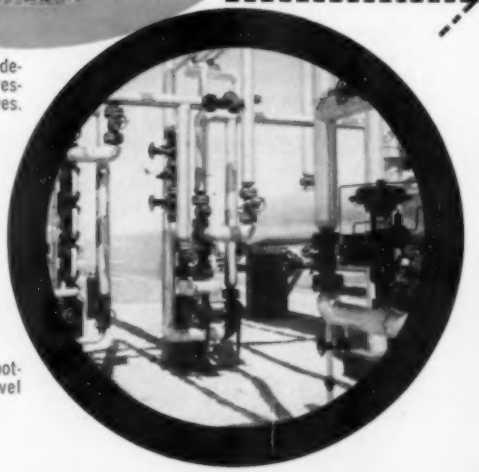


AT A KANSAS GASOLINE PLANT: Propane dehydrators in right foreground. In background, plant process pump area.

In foreground, depropanizer and debutanizer, reflux accumulator pressure relief and level control valves. Reflux pumps in background.



Left to right, de-ethanizer feed, bottoms exchanger, and liquid level control valve.

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Gulf Coast Construction Plans

REFINERIES are referred to by areas in this report. Each month a different area will be surveyed.

● **American Oil Co.** will increase Ultraforming capacity 21,000 bbl. per day and Hydrofining (Ind.) capacity 22,000 bbl. per day at Texas City, Tex. **Ralph M. Parsons** has contract.

● **Atlantic Refining Co.** is building a 2,100-bbl. per day alkylation unit at Port Arthur, Tex. **Fluor Corp.** has contract. Completion is set for spring 1958.

● **Atlas Processing Co.** is building a 3,500-bbl. per day Penex (U. O. P.) isomerization unit at Shreveport, La. Completion is set for early 1958.

● **Chemoil Corp.** will complete a new plant between New Orleans and Baton Rouge, La., December 1958. It will have crude capacity of 22,000 bbl. per day, a 10,000-bbl. per day vacuum unit to charge topped crude, a 14,000-bbl. daily gas-oil cracker, a 5,000-bbl. per day naphtha reformer, a 9,000-bbl. daily delayed coker to produce 350 tons of coke per day, a 3,000-bbl. daily hydrofluoric acid alkylation unit, a 1,000-bbl. per day catalytic polymerization unit, and a hydrogenation unit.

● **Continental Oil Co.** will complete a 10,000-bbl. per day delayed coker at Westlake, La., November 1957.

● **Esso Standard Oil Co.** will increase gas-oil cracking capacity 5,000 bbl. per day and lube production 150 bbl. per day at Baton Rouge, La., by December 1957.

● **Evangeline Refining Co., Inc.,** will add a 1,000-bbl. per day Catformer at Jennings, La.

● **Gulf Oil Corp.** will increase Platforming capacity 26,000 bbl. per day at Port Arthur, Tex., by early 1958. **Procon, Inc.,** has contract to build a 10,000-bbl. per day pentane isomerization unit (Penex).

● **Humble Oil & Refining Co.** will complete two hydrodesulfurization units with 90,000-bbl. daily capacity at Baytown, Tex., by January 1, 1958. **Ralph M. Parsons Co.** has contract. A 55,000-bbl. per day Humble fluid catalytic cracker (no recycle) will be completed February 1, 1958, by **Foster Wheeler Corp.**

● **Magnolia Petroleum Co.** will complete a 100,000-bbl. daily atmospheric distillation unit and a 32,000-bbl. per day vacuum unit charging topped crude (both to replace some existing capacities) at Beaumont, Tex., by March 1958. **Foster Wheeler Corp.** is contractor. A 30,000-bbl. per day Sovafiner will be completed and sulfuric acid alkylation capacity increased 8,000 bbl. per day by March 1958. Engineering and construction are by **C. F. Braun & Co.**

● **North American Petroleum Corp.** has bought a site for a new plant at Corpus Christi, Tex. Construction has not started.

● **Phillips Petroleum Co.** will complete a 16,000-bbl. per day reforming unit and desulfurization facilities at Sweeny, Tex., January 1, 1958. Cost is $4,000,000. **Fluor Corp., Ltd.,** has contract.

● **Seminole Oil Co.** has indefinite plans for a refinery at Fort Pierce, Fla., to be operated by Frontier Refining Co.

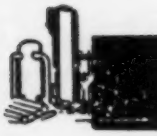
● **Shell Oil Co.** will complete a 16,000-bbl. per day U.O.P. Platforming-Unifining unit at Norco, La., summer 1958. **Procon, Inc.,** has contract. **Foster Wheeler Corp.** and **J. F. Pritchard Co.** will build auxiliary facilities.

● **Southland Co.** has bought site at Black Point, Fla., for an $8,000,000, 15,000-bbl. per day plant.

● **Sunshine State Refineries, Inc.,** plans a 10,000-bbl. daily plant at Plant City, Fla.

● **Texas City Refining Co.** will increase Houdriflow capacity 1,000 bbl. per day (no recycle), add a 7,000-bbl. daily Houdry hydrogenation unit and a 7,000-bbl. daily Houdriformer at Texas City, Tex., by late 1957. **Catalytic Construction Co.** has contract for the Houdriformer. Cost will be $2,000,000.

A New Series



FIELD PROCESSING

NATURAL GASOLINE REFINING

Handling Sour Gas and Oil Production

By R. S. Birmingham

DEVELOPMENT of sour gas and oil production in Wyoming posed many new operational problems. Experience and scientific research have answered many of these problems met while developing this extremely sour production economically.

● Wyoming's major production areas of sour gas and oil (gas and oil containing hydrogen sulfide and carbon dioxide) have been developed during the past 12 or 13 years. The heavy demand for fuel oil during the later years of World War II and the need for natural gas in the Wyoming area gave the incentive for development.

● Sour gas and oil production is found for the most part in seven of Wyoming's 24 counties. The area which produces most of the gas of high acid gas concentrations (15 to 68 per cent hydrogen sulfide and appreciable amounts of carbon dioxide) lies within the Big Horn River basin in Park, Big Horn, Washakie, and Hot Springs counties. Gas containing lesser amounts of hydrogen sulfide is produced in Sweetwater, Fremont, and Carbon counties.

Sour production in these seven counties is produced from the Embar (Phosphoria and Dinwoody zones) and Tensleep formations.

Three of Wyoming's sour gas and oil field have complete integrated facilities for handling sour casing-head gas, all of which are in the area known as the Big Horn basin.

Pan American Petroleum Corp., previously Stanolind Oil & Gas Co., operates such facilities at Elk Basin, near Powell, Wyo. The primary purpose of this operation was pressure maintenance of the Elk basin Embar-Tensleep unit. The plant was designed to process casing-head gas produced from the unit by removal and recovery of liquid hydrocarbons and sulfur. Residue gas remaining was not sufficient for pressure maintenance, thus boilers were installed to generate inert gas as a product of combustion which is compressed to 1,500 psig. and injected back into producing formation. A desirable field surface pressure, along with potential producing rate, have in this manner, been maintained.

Author is with Pure Oil Co., Worland, Wyo. Paper presented at Rocky Mountain regional meeting, Natural Gasoline Association of America, 1957.

River Dome field . . . Sour gas and oil produced from the Worland unit, operated by Pure Oil Co., in River Dome field near Worland, Wyo., is gathered in a simultaneous gathering system which terminates at a crude stabilization and natural-gasoline plant operated by Pure. At this point the sour gas is separated from the oil and water. The separated crude oil is stabilized by the removal of its hydrogen sulfide and light hydrocarbons content through propane. Stabilized oil is then delivered to crude-oil storage.

The separated sour gas which contains 30 per cent hydrogen sulfide and 2 per cent carbon dioxide, is delivered to Texas Gulf Sulphur Co. for acid gas removal and sulfur recovery. Semisweet gas, less than 5 grains hydrogen sulfide per 100 s.c.f., is returned by Texas Gulf Sulphur to the gasoline plant where natural gasoline and L.P.G. are recovered by absorption process. The residue gas remaining is delivered to Montana Dakota Utilities Co. Since the residue gas is slightly sour and has not been dehydrated, Montana Dakota Utilities, dehydrates sweetens, and compresses it to their specifications.

Manderson field . . . The most recently installed natural-gasoline plant and sulfur extraction facilities are located in Manderson field near Manderson, Wyo. The gasoline plant is operated by Mobil Producing Co. The plant was designed to process the gas produced in the Manderson area using compression and fractionation for the recovery of natural gasoline and L.P.G. is well as acid gas removal. Sweetened and dehydrated residue gas is delivered to Montana Dakota Utilities Co.

The acid gas which is absorbed in Mobil's purification unit, is delivered to a sulfur-recovery plant operated by Jefferson Lake Sulphur Co. Free sulfur is recovered and sold as a liquid or in flake form.

Several other sulfur-recovery plants are in operation within the several counties producing sour gas. Signal Oil & Gas Co. has one such facility, known as Nieber Dome plant. It is located in Neiber Dome field some 15 miles south of Worland. Sour gas produced in this area is gathered and delivered to the Nieber Dome plant for sulfur removal and recovery. Sweet gas is dehydrated and returned to the field for operational use.

Gathering and Separation

Most of the sour oil and gas produced is separated in the same manner as less sour or sweet production. The common practice is to employ oil-field gas-oil separators for lease or well separation of oil and gas. Oil is pressured to field tank batteries and gas effluent is gathered and delivered to central gas-processing facilities.

Simultaneous unit . . . The Worland unit installed a simultaneous gas-oil gathering system that delivers the oil and gas from the wells to the central crude stabilization facilities which function as a part of the natural-gasoline plant which Pure operates. This method of handling has proven very satisfactory besides offering several desirable benefits over field separation that are herein briefly described.

Sour well streams, oil, gas, and water are gathered in a common gathering system at approximately 340 psig. for delivery to the crude stabilization facilities.

Separation . . . Here the gas is separated from the oil and water in conventional oil-field gas-oil separators operating at 300 psig. The oil is then heated and flashed at approximately 285 psig. The separator sour gas effluent plus the gas derived from heating and flashing the oil is delivered to the sulfur-recovery plant at a pressure of 280 psig. where the acid gas is removed.

By W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Cost Indexes of Heat Exchangers

In your cost index you show an index for the cost of heat exchangers. Are you able to distinguish between the cost of brass-bundle and steel-bundle equipment? S.G.F.

The index for heat exchangers is composed of four major kinds of units:

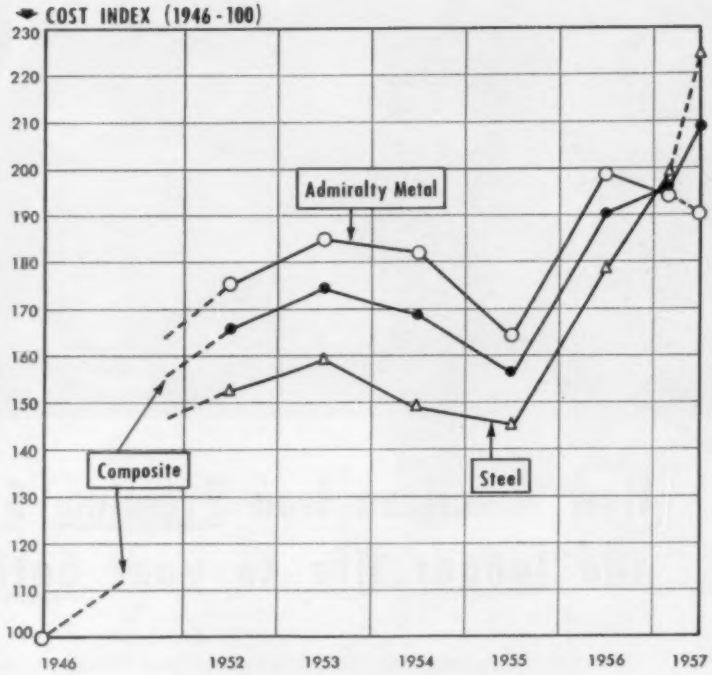
One admiralty condenser: 32-in. o.d. shell with a design pressure of 300 psi. on both the shell and tube sides, containing 363 1-in. o.d. 14 B.W.G. admiralty tubes on 1½-in. square pitch (length 16 ft., area 1,570 sq. ft.). The tube sheets are rolled naval brass on both the stationary and floating ends of the bundle. ($5,200.00, 1946).

One steel exchanger: 28-in. o.d. shell with a design pressure of 300 psi. on both the shell and tube sides, containing 550 ¾-in. o.d. 18 B.W.G. steel tubes on 15/16-in. triangular pitch (length 16 ft., area 1,700 sq. ft.). The tube sheets are steel. ($3,570.00, 1946).

Five admiralty fintube units ($1,370.00, 1946).

Five steel fintube units ($960.00, 1946).

The cost indexes, when these are separated into admiralty and steel equipments, are shown in Fig. 1.



COST INDEXES of heat exchangers. Fig. 1.

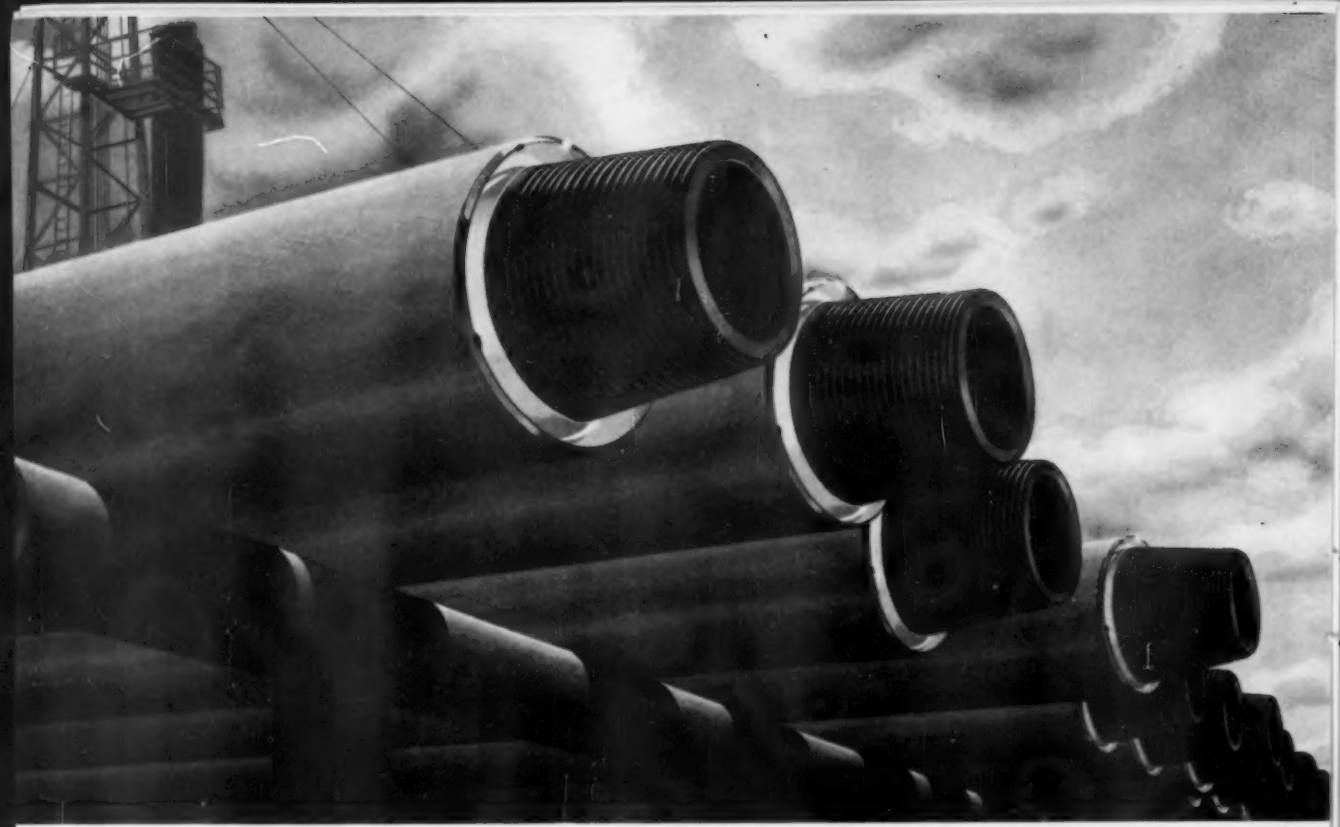
Storage of Jet and Rocket fuels

Have any papers been published on the storage of jet and rocket fuels? R.D.S.

Conventional cone-roof storage tanks have been used for the storage of these materials but floating-roof equipment is the safest and the approved type of tank.

Literature on this subject is scant, but this may be because little or no trouble has been encountered. As early as 1950, a study group of the Aviation Fuels Division of the C.R.C. Coordinating Fuel and Equipment Research Committee reported (C.R.C.-245, "1945 Desert Storage Tests on Stability of AN-F-32 Aviation Fuels," S.A.E. Special Publications Department) that the fuels of that period exhibited satisfactory storage characteristics and the report also discusses the effect of the conventional inhibitors on storage stability. During 1954, a series of five short articles appeared in the Refiner's Notebook section of The Oil and Gas Journal (Thompson, J. W., Oxidation Stability of Jet Fuels—June 7, June 21, June 28, July 5, and July 12). These articles discuss oxidation and the inhibitors studied by Eastman Kodak Co., but tell little about stability during long storage. J. L. Risinger ("How to Handle and Store Jet Fuels," Petroleum Refiner, May 1957, p. 304) discusses storage but from the standpoint of safety and fire protection rather than stability.

Recently, refiners have been troubled in trying to meet a new high-temperature stability test (Erdco) which requires a high degree of stability at 400° F. (filter at 500° F.) during a 5-hour test period. It certainly does not follow that such fuels will be stable for long periods under atmospheric storage conditions, but one would expect that they would be almost completely stable for several years.



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Among the Drilling Contractors

Cactus Drilling Takes on New Area Representative

Cactus Drilling Co., Hobbs, N. M., has employed Don G. Stevens, formerly assistant professor at Texas Technological College, Lubbock, Tex., as its new contact representative in the Permian basin area. The company has 11 rotary and cable-tool rigs operating in that region, embracing West Texas and southeastern New Mexico.

Stevens taught courses in real property and oil and gas law at the college. He is a 1956 graduate of the University of Texas School of Law. Previously, he had been associated with Tobin Aerial Mapping Co., of San Antonio, as landman in southern Louisiana, and with Rinehart Oil Reports as representative at Austin.

With Cactus Drilling Co. he will direct his efforts to acquisition of farmouts and drillable properties. He will be located at company headquarters, in Hobbs, under the direction of George Baker, vice president. President of the company is Frank M. Late.

Ruhl Drilling Co., Houston, has a rig running on a wildcat location west of Henderson, in Rusk County, East Texas. It is drilling for Trice Production Co., of Lovington. The test, projected to 7,500 ft. and now nearing its objective, is carried as 1 Grady Hays Unit. Location is in the H. Cockburn Survey.

Butler-Johnson, Inc., Shreveport, has a rig working on a new Tuscaloosa test about 2½ miles southwest of Crimea, in Tensas Parish, northeastern Louisiana. It is a contract job for Sam Sklar, also of Shreveport. Location, at 1 Rives, in 5-11n-11e, is about 3½ miles southeast of Justina field, nearest production. A test to 8,750 ft. is planned.

E. D. Markham, Shreveport, is well down on a newly started Travis Peak test it is drilling for Olin Oil & Gas Corp. at a wildcat location 3 miles south of Spider field, in DeSoto Parish, North Louisiana. Its location, at 1 McMillan, in 27-11n-14w, is about 8 miles southwest of Mansfield. Hole is expected to be carried to 7,000 ft.

Justiss-Mears Drilling Co., Jena, La., has contracted for another in the series of wildcat tests H. L. Hunt is drilling on its Louisiana Delta Hardwood Lumber Co. lease in LaSalle Parish, Central Louisiana. Latest job is at No. 6-F, in 14-5n-3e, a little more than a mile southwest of Sandy Bend field, and about 1¾ miles northeast of North Big Island field. It is a 6,000-ft. Wilcox job.

Arrow Drilling Co., Tulsa, has a new deep operation on the northwest flank of Locust Ridge field, in Tensas Parish, northeastern Louisiana. It is Phillips Petroleum Co. 4 Winsboro, projected to the Tuscaloosa at 9,250 ft. It offsets a recently completed Tuscaloosa extension well drilled by **Jett Drilling Co.,** Shreveport.

Clegg & Hunt, Houston, will drill Pan American Petroleum Corp.'s projected 16,000-ft. test in Atchafalaya Bay, Terrebonne Parish, Louisiana. Pan American's location is on State Lease 3134. Nearest production is a Pointe Au Fer, at Terrebonne Parish's southwestern tip.

Goldrus Drilling Co., Houston, has a rig running on a new contract job in the Long Point area, southern Fort Bend County, Texas Gulf Coast. Drilling is for Harold Link, also of Houston, whose location, at 1 Howe, in H&TC Survey 57, is about a mile southwest of Frio gas-condensate production. Plans call for an 8,500-ft. test.

Helmerich & Payne, Inc., Tulsa, will be Pan American Petroleum Corp.'s contractor on a 9,200-ft. test it has projected for western Ellis County, in far-western Oklahoma, near Texas' Hemphill County line. Location is at 1 Sutter Unit, in 19-22n-23w. This is 11 miles southwest of Pan American's indicated Morrow discovery well at 1 Tune, in 35-24n-23w.

Great Northern Drilling Co. is drilling on a new contract job in the Blacktail area, 6½ miles northeast of Ingomor, in Rosebud County, Montana. It is a 4,500-ft. Otter test for Flank Oil Co. at 1 Magelssen, in 12-10n-35e.

Webster Drilling Co., Houston, has contract for Warren Petroleum Corp.'s second well in the recently opened Lower Mud Lake field, in the coastal marshes of Cameron Parish, Louisiana. Its location, on State Lease 2845, in the lake, is about 4,000 ft. west of

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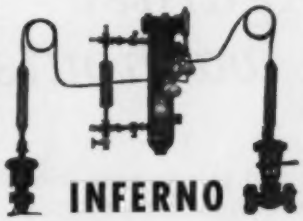

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Warren's discovery well (1 Richard), completed last April as a wet-gasser in an 11,400-ft. sand. The new test has a 12,000-ft. permit.

Milestone Drilling Co., Midland, Tex., is getting started on the first of eight tests it will drill in Section 1, Block B-23, PSL Survey, Crane County, West Texas. Milestone is associated with Seminole Oil & Gas Corp., of Dallas, in the project, with Oil & Gas Property Management, Inc., also of Dallas, looking after the operations.

Delta Drilling Co., Tyler, Tex., has contracted with TXL Oil Co. for a deep test to be drilled west of South Bell City field, in southeastern Calcasieu Parish, southwestern Louisiana. Location is at 1 Richard-Mallet Unit, in 18-11s-6w. It is about 1½ miles from production. The area is about 15 miles southeast of Lake Charles.

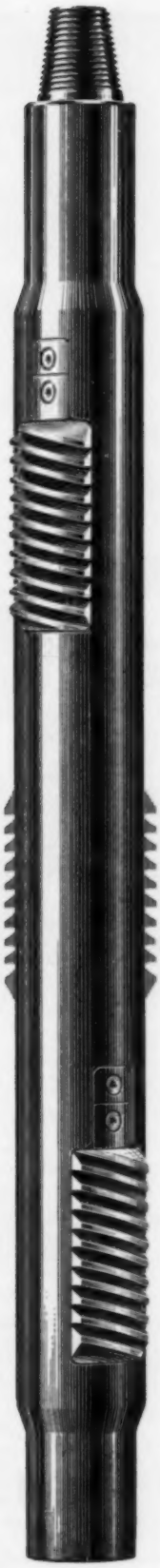
Production Maintenance Co., Houston, has a rig running on a wildcat test for Colorado Oil & Gas Corp. 11½ miles southeast of Rosenberg, Fort Bend County, Texas Gulf Coast. Location is in the William T. Austin Survey at 1 Moore. Operators expect to take the hole to 8,000 ft.

Norton Drilling Co., New Orleans, is under contract for 10,700-ft. well to be drilled for Aladdin Oil Co. in the Lafitte area, Jefferson Parish, southeastern Louisiana. Its location is for 1 Curol-Rojas, in 14-17s-24e.

General Well Drilling, Inc., Alice, Tex., is drilling for W. B. Osborn, of San Antonio, at a wildcat location 10 miles southwest of Alice, in western Jim Wells County, South Texas. Location is at 1-A Fitzsimmons, in the Charles B. Fitzsimmons Survey 78. Permit calls for a 6,500-ft. test.

Lockwood & Lunsford, Shreveport contractors, are drilling on a wildcat location about 2 miles northwest of Fouke field, in Miller County, southwestern Arkansas. It is a 4,500-ft. test for Lyons & Lyons, also of Shreveport. Spot location is in 27-16s-27w, on the operators' Fouke lease. It is about 9 miles southeast of Texarkana.

Prime Drilling Co., Wichita, Kans., is on a wildcat location 8 miles east of Greensburg, in eastern Kiowa County, southwestern Kansas, where it is drilling a 4,800-ft. Mississippian test for Sam Smith, Jr., also of Wichita. Location, at 1 Ross, in 14-28-17, is about 2 miles west of Havaland, nearest production.



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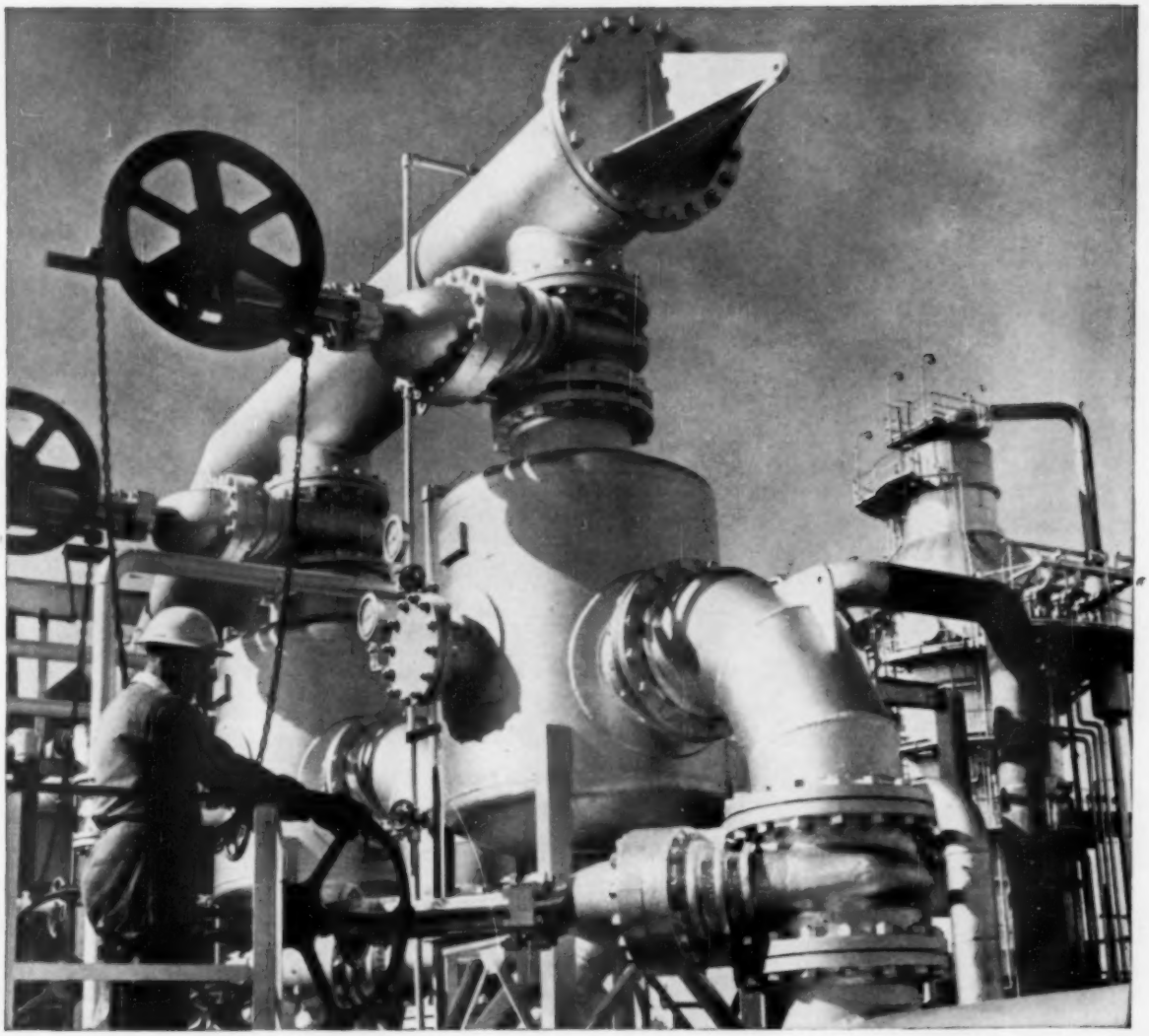

BP REFINES IN AUSTRALIA

THE £A40,000,000 Kwinana refinery, the largest in the Southern Hemisphere, is situated 17 miles south of the Port of Fremantle and is operated by BP Refinery (Kwinana) Limited, one of BP's Australian Associates.

Kwinana Refinery was officially opened by the Governor General, Field Marshal Sir William Slim, in October 1955 – three and a half months ahead of schedule.

In the first year of operation the refinery processed 2,000,000 tons of crude oil, producing petrol, kerosene, diesel and fuel oil for the markets of Australia, New Zealand and neighbouring countries.

Preliminary work has now started on the new expansion scheme. This includes the erection of the latest design of catalytic reforming plant for upgrading low octane motor spirit, and the building of increased storage facilities.

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Pipeline Patrol

...Report on Construction

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way.

U.S. Crude-Oil Pipelines

• **Belle Fourche Pipeline Co.**
Project: 30 miles of 6-in. from Donkey Creek pool to Fiddler Creek pool in northeastern Wyo. Will later build a line from Fiddler Creek to connect with Butte Pipe Line Co. near Osage, Wyo.
Status: Planned.

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.)
Project: Line from lower Delaware Bay to Philadelphia.
Status: Long range plans.
Completion: 1960.

• **Forest Pipeline Corp.**
Project: 35 miles of 8-in. from Grieve field, Wyoming, to Platte Pipe Line at Casper.
Status: Under way.
Completion: Early December 1957.

• **Four Corners Pipe Line Co.** (Shell, Standard of Calif., Continental, Gulf, Richfield, Superior)
Project: 635 miles of 16-in. from Aneth field in southern Utah to Los Angeles, 86 miles of 12-in. from New Mexico's Bisti field to Red Mesa station 35 miles southeast of Bluff, Utah, and 3 miles of 6, 8, 10-in. feeder lines from other fields in New Mexico and Utah. Will be operated by Shell Pipe Line.
Status: Under way.
Contractor: **A. P. Vaughn Construction Co.** and **Potashnick Construction Co.** have 170 miles of 16-in. from Aneth field to Cameron, Ariz., and 100 miles of 16-in. from Seligman to the Colorado River. **R. H. Fulton & Co.** has completed 98 miles of 16-in. from Cameron to Seligman, Ariz., and has 217 miles of 16-in. from the Colorado River to Olive, Calif., plus river crossing. **Pacific Pipeline Co.** has 46 miles of 16-in. from Olive to Los Angeles. **Standard Pipeline Construction Co.** has feeder lines.
Completion: January 1, 1958.

• **Great Northern Railway Co.**
Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Montana and North Dakota, to Clearbrook or St. Paul, Minn.
Status: Planned.
Contractor: **Pipe Line Technologists, Inc.** has completed feasibility study.

• **Interstate Oil Pipe Line Co.**
Project: 5 miles of 4-in. from South Bosco field, and 5 miles of various size from Church Point field, La., to present main line.
Status: Proposed.

• **Magnolia Pipe Line Co.**
Project: 24 miles of 20-in., 20 miles of 12-in., 83 miles of 16-in. from Corsicana to Baird, Tex.
Status: Under way.
Contractor: **H. B. Zachry Co.**, Ray Qualls, supt., office at Hico.
Completion: November 1, 1957.
Project: 120 miles of 16-in., 4 miles of 12-in. from Clyde to Midland, Tex.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.**
Completion: December 31, 1957.

• **Muskegon Pipe Line Corp.** (Aurora Gasoline Co., Service Pipe Line Co.)
Project: 165 miles of 10-in. from Griffith, Ind., to Muskegon, Mich.
Status: Under way.
Contractor: **Midwestern Constructors, Inc.** has two spreads working: North end, W. T. Wilhite, supt., office at Coloma, Mich.; South end, office at Chesterton, Ind.
Completion: Late 1957.

• **Offshore Gathering Corp., Houston.**
Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana. (Dual line.)
Status: Proposed.

• **Oil Field Pipe Line, Inc.**
Project: 200 miles 8 and 12-in. line from near Elkhart, to Ellinwood, Kans.
Status: Proposed.

• **Salt Lake Pipe Line Co.**
Project: 93 miles of 10-in. loops from Rangely, Colo., to Salt Lake City.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**
Completion: December 1, 1957.

• **Service Pipe Line Co.**
Project: 4 miles of 12-in. loop between Dyer and Griffith, Ind., and 8 miles of 24-in. loop in Will County, Ill.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.**
Project: 84 miles of 10-in. in Ind. and Mich.
Status: Under way.
Contractor: **Midwestern Constructors, Inc.**, R. C. Stanley, supt., office at Chesterton, Ind.

• **Shell Pipe Line Co.**
Project: 100 miles of 16 or 20-in. from Delta area of S. La., to Norco, La.
Status: Planned.

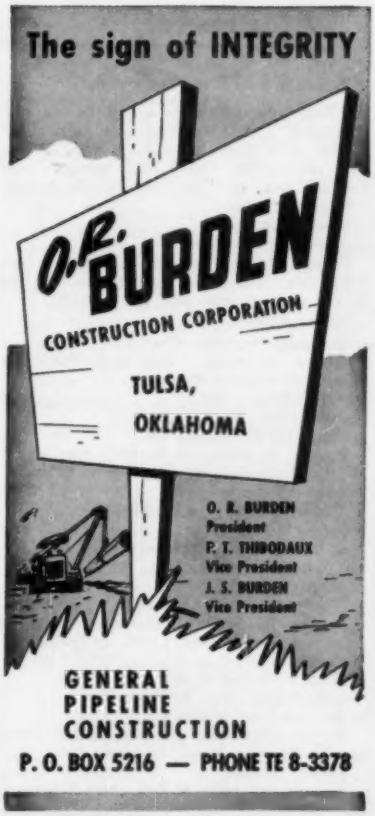
• **Sinclair Pipeline Co.**
Project: 150 miles of 20-in. from Teague, Tex., to Houston.
Status: Planned for 1958.
Completion: 1958.

• **Skelly Oil Co.**
Project: 38 miles of 8-in. extension of its gathering system into southern Kiowa County, Kansas.
Status: Under way.
Completion: Early fall 1957.
Project: 50 miles of 12-in. to replace partially looped 6, 8-in. line between Cunningham and Burton, Kans.
Status: To start as soon as pipe is received.
Completion: Late 1957.

• **Southern Kansas Pipeline, Inc.**
Project: 200 miles of 6 to 10-in. in Kans. from southwestern Meade County to 10 miles north of Arkansas City.
Status: Proposed. Request filed with Kansas Corporation Commission for permit.

• **Texas-New Mexico Pipe Line Co.** (Sinclair, Texas Co., Tidewater, Empire)
Project: 512 miles of 16-in. from southeast corner of Utah to Jal, N. M.
Status: Under way.
Contractor: **Four Way Co., Inc.**, has 150 miles from Aneth field southeast. **Panama, Inc.**, has remaining 362 miles.
Completion: 1958.

• **Texas Pipe Line Co.**
Project: 7 miles of 8-in. in West Cote Blanche Bay, La.
Status: Under way.
Contractor: **Houston Contracting Co.**, H. E. Murphy, supt., office at Franklin.



Pipeline Patrol

U.S. Products Pipelines

• **Alaska-Yukon Refiners & Distributors, Ltd.**
Project: Two lines: one 150 miles from Haines to Haines Junction, Alaska, linking with government Canol line; another from Tok Junction, on Canol line, to Anchorage.
Status: Proposed.
Completion: 1959.

• **American Pipe Line Co.**
Project: Line from Gulf Coast to New York City. Has ODM approval to amortize 40 per cent of cost with fast writeoff.
Status: Proposed.

• **Buckeye Pipe Line Co.**
Project: 70 miles of 8-in. from Wayne to vicinity of Durand, Mich.
Status: Under way.
Completion: Early 1958.

• **Clark Oil & Refining Co.**
Project: 15 miles of 8-in. from Blue Island, Ill., to Hammond, Ind., area.
Status: Planned.

• **Columbia Gas System, Inc.**
Project: Line from proposed plant near Kenova, W. Va., to proposed plant and storage facilities at Siloam, Ky.
Status: Planned.

• **Conn-Mass Pipe Line, Inc.**
Project: 62 miles of 8-in. and 7 miles of 6-in. from New Haven, Conn., to Springfield, Mass.
Status: Planned to begin in 1957.
Completion: April 1958.

• **El Paso Natural Gas Co.**
Project: 11 miles of 4-in. L.P.G. from Snyder Line to South Andrews Plant, Tex.
Status: Planned
Project: 240 miles of 6-in. from Odessa to El, Paso, Tex.
Status: Under way.
Contractor: **McVean & Barlow, Inc.**, E. J. Miller, supt.
Completion: March 1, 1958.

• **Emerald Pipe Line Corp.**
Project: 120 miles of 6-in. from Sunray, Tex., to Tucumcari, N. M.
Status: Under way.
Completion: December 1, 1957.

• **Engineering Management, Inc.**
Project: 37 miles of 4, 6-in. L.P.G. line from Niland to El Centro, Calif.
Status: Under way.
Contractor: **Hood Construction Co.**, C. L. Jernigan, supt., office at Brawley.
Completion: November 1957.

• **Everglades Pipe Line Co.**
Project: 60 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport and terminals south.
Status: Under way.

• **Florida Pipeline & Storage Co.**
Project: 67 miles from Everglades, Fla., to Homestead Air Force Base south of Miami.
Status: Under way.
Contractor: **Fish Service Corp.**
Completion: December 1957.

• **Gillette Pipeline, Inc. and A. W. Hartwig, Inc.**
Project: A 103-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Has applied for permit from Wyoming Public Service Commission.

• **Great Lakes Pipe Line Co.**
Project: 93 miles of 8-in. from south of St. Paul to Eau Claire, Wis.; 68 miles of 12-in. from Great Lakes intersecting point with Badger Pipe Line to Chicago.
Status: Under way.
Contractor: **R. H. Fulton & Co.** has the 8-in. **Midwestern Contractors, Inc.**, has 20 miles of 12-in. in Chicago area and **M-R Co.** has completed 48 miles of 12-in. from Badger system east.
Completion: Late 1957.
Project: 15 miles of 6-in. from Lincoln, Neb., to Lincoln air base.
Project: 140 miles of 8-in. from Minneapolis to Superior terminals.
Status: Under way.
Contractor: **Laco Pipeline Contractors, Inc.**
Project: 14 miles of 8-in. from Coffeyville to Independence, Kans., replacing 4-in. line.
Contractor: **Jess Whitlow Pipe Line Service.**
Project: 11 miles of 8-in. from 10 miles east of Donahue, Iowa, to terminals at Bettendorf, Iowa.
Contractor: **R. T. Perry Pipe Line Construction.**

• **Katy and New York Central Railroads**
Project: 2,000 miles of 10 or 12-in. from Houston through Kansas City, St. Louis, Indianapolis and Cleveland to Syracuse then down to New York City. A branch would go through Chicago to Detroit.
Status: Proposed.
Contractor: **Williams Brothers Co.** has feasibility study.

• **Laurel Pipeline Co. (Gulf Refining Co., Sinclair Pipe Line Co., The Texas Co.)**
Project: 100 miles of 24-in. and 340 miles of line graduating down to 14-in. at the west terminus, from Philadelphia to Cleveland.
Status: To start early 1958.
Completion: 1958.

• **Leonard Refineries, Inc.**
Project: 43 miles of 6-in. from Alma to Lansing, Mich.
Status: Planned.
Completion: Late fall 1957.
Status: Proposed.

• **Ohio Oil Co.**
Project: 350-miles of 12-in. from Wood River, and Robinson, Ill., to Chicago.
Status: Under way.
Contractor: **Panama-Williams Corp.** has 84 miles from Robinson to Champaign.
Completion: 1958.

• **Salt Lake Pipe Line Co.**
Project: 80 miles of 8-in. loops from Adams to Ontario, Ore.
Status: Under way.
Contractor: **Hallmac Construction Co.**

• **Shamrock Oil & Gas Corp.**
Project: Conversion of 120 miles of 6-in. crude line from Sunray, Tex., to Turpin, Okla.
Status: Under way.

• **Shell Oil Co.**
Project: Undetermined amount of 3, 4-in. in La. Delta area.
Status: Under way.
Contractor: **Brown & Root, Inc.**, W. P. Stanley, supt., office at Buras.
Completion: March 31, 1958.

• **Underground Storage & Exploration, Inc.**
Project: 393 miles of 12-in. L.P.G. line from Moundsville, W. Va., to Newark, N. J., plus 95 miles of 6, 8-in. laterals to Mauch Chunk, Pa., and to Philadelphia.
Status: Proposed.

• **Union Oil Co. of California**
Project: 815-mile line from Rifle, Colo., to Los Angeles refining area, to carry products from its Rifle shale-oil plant.
Status: Proposed.

U.S. Natural-Gas Pipelines

• **Arkansas Louisiana Gas Co.**
Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.
Status: Long-range plans.

• **Atlantic Seaboard Corp.**
Project: 6 miles of 26-in. from Petersburg to Moorefield, W. Va.
Status: Has temporary FPC approval.
Contractor: **Williams-Austin Contsruction Co.**
Completion: November 1957.

• **Carnegie Natural Gas Co.**
Project: Two parallel lines to provide coke-oven gas to six Pittsburgh area plants: 9 miles of 55-in. and 4 miles of 43-in. each.
Status: To start May 1958.
Contractor: **Williams Brothers Co.**
Completion: November 1958.

• **Carolina Pipeline Co.**
Project: 177 miles of 2, 3, 4, 6, 8, and 10-in. between Blacksburg and Camden, S. C.
Status: Under way.
Contractor: **Panama-Williams Corp.** and **P. A. Buchanan** have construction contract. **Coates Field Service, Inc.** has right-of-way acquisition and claims settlement contract.

• **Central Hudson Gas & Electric Corp.**
Project: 46 miles of 10-in. from Albany to Kingston, N. Y.
Status: Under way.
Contractor: **Williams-Austin Construction Corp.**, O. L. Martin and Ralph Gaddy, supts., office at Catskill, N. Y.
Completion: December 1, 1957.

• **Central Illinois Light Co.**
Project: 20 miles of 10-in. from Peoria to Roanoke, Ill.
Status: Under way.
Contractor: **Somerville-Illinois Co.**, Joe Boyd, supt., office at Peoria.
Completion: November 1, 1957.

• **Cities Service Gas Co.**
Project: 8 miles of 16-in., 20 miles of 8-in., 20 miles of 6-in., and 20 miles of 4-in. field lines in Barber County, Kansas.
Status: Under way.
Contractor: **Vaughn & Taylor Construction Co.**
Project: 3 miles of 12-in., 8 miles of 10-in., 4 miles of 8-in., 8 miles of 6-in., and 37 miles of 4-in. field lines in Eureka Field, Okla.
Status: Under way.
Contractor: **Prairie Construction Co.**
Project. 64 miles of 6 to 30-in. in Leavenworth and Anderson counties, Kans., Cass County, Mo., and Oklahoma County, Okla.
Status: Planned.
Project: 75 miles of 30-in. from Independence to near Welda, Kan.
Status: Under way.
Contractor: **R. H. Fulton & Co.**
Completion: December 1957.

• **Coastal States Gas Producing Co.**
Project: A 20-mile gathering system from the Rock Island area of Colorado County, Tex., to the United Gas Corp. system.

• **Coastal States Gas Producing Co. and Southern Coast Corp.**
Project: 45 miles of 2 to 10-in. in Bee County, Tex. to connect presently shutin fields with Texas Eastern Transmission Corp.'s system.
Status: Planned.

• **Coastal Transmission Corp.**
Project: 575 miles of 12, 20, 22, 24-in. main line and 414 miles of 2 to 14-in. gathering lines between McAllen, Tex., and Baton Rouge, La.
Status: Under way.
Completion: January 1, 1958.

• **Colonial Natural Gas Corp.**
Project: Two systems; one between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.
Status: Proposed.

• **Colorado Interstate Gas Co.**
Project: 1957 program . . . 66 miles of 30-in., 40 miles of 34-in., 109 miles of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pueblo, Colo; 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, Neb.; 24 miles of 22-in. Panhandle field looping.
Status: Approved by FPC examiner.
Status: Pending FPC approval. Has temporary approval for the 50 miles in Okla.

• **Eastern Shore Natural Gas Co.**
Project: 34 miles of 8-in. and 90 miles of 6-in. from connection with Transcontinental Gas Pipe Line Corp. in Maryland, across entire length of Delaware to Salisbury.
Status: Pending FPC approval.

Pipeline Patrol

• **East Ohio Gas Co.**
Project: 90 miles of 24-in., and 23 miles of 30-in. from Richfield to Summerfield, Ohio.
Contractor: **Sharman, Allen, Gay & Taylor, Inc.,** James Adams, spread superintendent, office at Wadsworth, Ohio. **Coates Field Service, Inc.** has right-of-way acquisition and claims settlement contract.
Completion: November 1957.

• **Edison Securities Co.**
Project: 130 miles of 30-in. from San Joaquin Valley fields to Wilmington, Calif.
Status: Being contested by Southern California Gas Co., Southern Counties Gas Co., and Pacific Lighting Gas Supply Co.
Contractor: **Bechtel Corp.**

• **El Paso Natural Gas Co.**
Project: 81 miles of 18-in. and 13 miles of 20-in. from Panoma Plant, Gray County, to Dumas Plant, Moore County, Texas.
Status: Under way.
Contractor: **R. H. Fulton & Co. Coates Field Service, Inc.** has right-of-way acquisition and claims settlement contract.
Completion: November 1, 1957.
Project: 177 miles of 20-in. from Sonora Plant, Sutton County, to Plains Plant, Yoakum County, Texas.
Status: Planned. Filed for FPC permit.
Completion: January 1958.
Project: 74 miles of 30-in. Permian-San Juan main line loops.
Status: Planned. Filed for FPC permit.
Completion: January 1958.
Project: 216 miles of 6 to 34-in. and 533 miles of various size in Ariz., Tex., N. M.
Status: Filed for FPC permit.
Project: 47 miles of 30-in. from proposed Lindrith, N. M., plant to proposed Chaco, N. M., plant.
Status: Under way.
Contractor: **Foutz & Bursum Construction Co.**
Completion: 1957.
Project: 38 miles of various size line to make additional gas available at the McElroy-Wilshire plant near Crane, Tex.
Project: 500 miles of 34-in. from Twin Falls, Idaho to California border near Las Vegas, Nev.
Status: Planned.
Completion: September 1959.
Project: 131 miles of 4, 6, 8, 10, 12, 16, 18 and 20-in. gathering lines in Gray, Wheeler, and Collingsworth counties, Texas Panhandle.
Status: Under way.
Contractor: **R. H. Fulton & Co.**
Completion: 1957.

• **Houston Texas Gas & Oil Corp.**
Project: 702 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 139 miles of 18-in. and 101 miles of 20-in. from Kissimmee to Cutler, Fla.; 642 miles of 3 to 18-in. sales laterals in Florida. Main line to join Coastal Transmission's proposed line from McAllen, Tex., to Baton Rouge.
Status: To start November 1.
Contractor: **Midwestern Constructors** has the 702 miles of 24-in.; **Harbert Construction Corp.** has remainder.
Completion: June 1958.

• **Iron Ranges Natural Gas Co., St. Paul.**
Project: 68-mile transmission line and 47 miles of laterals to supply towns on the Mesabi Iron Range, Minn.
Status: Application pending with FPC.

• **Kansas-Nebraska Natural Gas Co.**
Project: 61 miles of various size gathering line in Camerick field, Texas County, Okla.
Status: Approved.

• **Kerr-McGee Oil Industries, Inc.**
Project: 24 miles of 4-in. in Blocks 21, 22, and 32 to connect wells with its Breton Sound production island off the Louisiana coast.

• **Manufacturers Light & Heat Co.**
Project: 3 miles of 12-in. from Wellsville to a point in Saline Township, Ohio; 8 miles of 12-in. in Brook County, W. Va.; 4 miles of 10-in. in Ohio County, W. Va.
Status: Has temporary FPC authority.

• **Michigan Consolidated Gas Co.**
Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.;** Floyd Huduall, supt., office at Cadillac.
Project: 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich.
Status: Under way.

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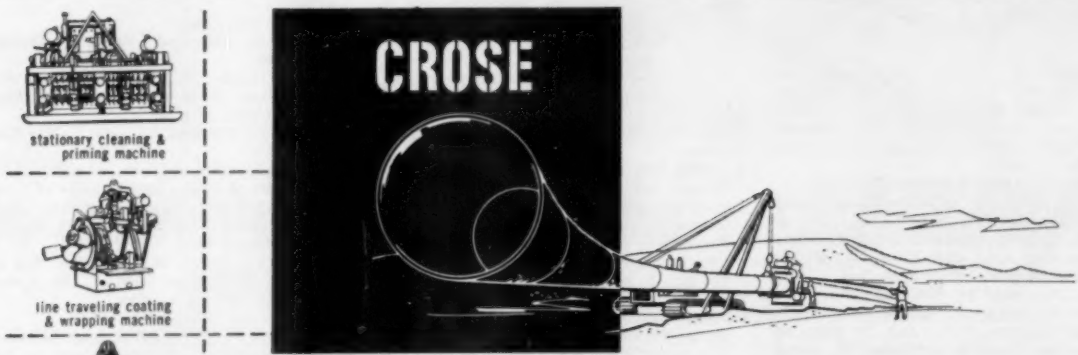

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Contractor: **Somerville Construction Co.** jointly with **H. L. Gentry Construction,** Frank Morris, superintendent, office at Hart, Mich.

• **Midwestern Gas Transmission Co.**

Project: Will build main line from Portland, Tenn., to Canadian border near Emerson, Man.; 829 miles of 24-in., 109 miles of 16-in., 174 miles of 12-in., plus 648 miles of 3 to 18-in. extensions in Minn. and Wis.

Status: Application pending with FPC.

• **Mississippi River Fuel Corp.**

Project: 54 miles of 26-in. loops between Perryville, La., and Columbia, Ill.

Status: Under way.

Contractor: **Cape Construction Co., Inc.**

Completion: November 15, 1957.

• **Montana-Dakota Utilities Co.**

Project: 28 miles of 12-in. from Fallon County to Dawson County, Montana.

Status: Approved.

Project: 6 miles of 12-in. between Mandan and Bismarck, N. D.

Status: Has temporary approval.

• **Mountain Fuel Supply Co.**

Project: Extension of 12-in. line from Ogden to Logan and Brigham City, Utah.

Status: Has applied to Utah Public Service Commission.

Completion: Late 1957.

• **Natural Gas Pipeline Co. of America**

Project: 350 miles of 20 and 26-in. from Jack and Wise counties, Texas, to Fritch, Tex., plus a gathering system.

Status: Under way.

Contractor: **R. H. Fulton & Co.** has Red River crossing in northern Montague County. **Fulton & Brodie, Inc.,** has gathering system. **Eastern Pipeline Contractors** has completed 86 miles of 20-in. from Bridgeport, Tex., to Healdton, Okla. **River Construction Corp.** has 86 miles of 26-in. from Mountain View, Okla., to Wheeler, Tex., Henry Arthur, spread supt., office at Hobart, Tex., and 87 miles of 26-in. from Wheeler to Fritch, Tex., D. C. White, supt., office at Pampa, both to be completed December 1, 1957. **H. B. Zachry Co.** has 88 miles of 26-in. between Ringling and Mountain View, Okla., Aldress Kilgore, supt., office at Duncan, to complete November 15, 1957.

Completion: January 1, 1958.

Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co., and 91 miles of 30-in. loops along parts of its main line.

Status: Approved by FPC examiner.

Project: 337 miles of 30-in. between Fritch, Tex., and Beatrice, Neb., and 59 miles of 36-in. between Beatrice and Joliet, Ill., along existing system.

Status: Pending FPC approval.

Completion: 1959.

• **Niagara Mohawk Power Corp.**

Project: 196 miles of 2 to 16-in. transmission and distribution mains to service areas in central, eastern and northern New York.

Status: Planned.

Contractor: Various.

Completion: December 31, 1957.

• **North Carolina Natural Gas Corp.**

Project: 630 miles of 2 to 16-in. from near Mooresville, eastwardly across N. C.

Status: To start fall 1957.

Completion: Spring 1958.

• **Northern Natural Gas Co.**

Project: 160 miles of 2, 3, 6, 8-in. branch lines to serve 20 new communities on Aberdeen, S. D., line.

Status: Under way.

Contractor: **Troth Construction Co.**

Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek fields in Alberta, Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.

Status: Proposed.

Project: 365 miles of main line and 1,090 miles of branch lines to serve communities in Minn., Iowa, S. D., Nebr., Wis.

Status: Filed with FPC March 18, 1957.

Project: 85 miles of 24 and 30-in. loops between Sunray, Tex., and Sioux City, Iowa.

Status: Under way.

Contractor: **R. H. Fulton & Co.**

Completion: December 1957.

Project: 13 miles of 16-in. to replace existing 10-in. line in Hansford County, Texas.

Status: Has temporary FPC authority.

• **Northern Utilities Co.**

Project: 35 miles of 16-in. in Fremont-Natrona County, Wyo., area; 8 miles of 12-in. around Casper; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander area.

Status: Planned.

• **Offshore Gathering Corp., Houston.**

Project: 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. (Dual line.)

Status: Application pending with FPC.

• **Ohio Fuel Gas Co.**

Project: 30 miles of 24-in. looping from Pavonia to Attica, Ohio.

Status: Under way.

Completion: November 25, 1957.

Project: 152 miles of line in Ohio: 43 miles of 24-in. from Crawford Station to Utica; 18 miles of 24-in. from Pavonia Station to Line D; 6 miles of 20-in. from Mount Gilead to Claridon; 4 miles of 20-in. near Dayton; 4 miles of 20-in. near South Charleston; 7 miles of 16-in. near Springfield; 6 miles of 20-in. near Oberlin; 17 miles of 20-in. from Oak Hill to Symmes Station; 7 miles of 12-in. from Mount Sterling to Bloomingburg; 2 miles of 8-in. near Bellefontaine; 3 miles of 12-in. near Mansfield; 4 miles of 12-in. near Lakeville; 7 miles of 8-in. in Guernsey and Belmont counties.

Status: Under way.

Contractor: **O. R. Burden Construction Corp.** has completed 43 miles of 24-in. from Sugar Grove near Crawford station, to Utica, Ohio, and 27 miles of 20-in. south from Wellston.

• **Pacific Gas & Electric Co.**

Project: 138 miles of 34-in. looping of the Topock-Milpitas line.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.**

Completion: December 1, 1957.

Project: 5 miles of 16-in., 160 miles of 12-in., 8 miles of 6-in. from Corning to Eureka, Calif.

Status: Planned.

Contractor: **Engineers Limited Pipeline Co.** and **Alex Robertson Co.**

Completion: January 1, 1958.

Project: 1,300 miles of 36-in. from Alberta to San Francisco.

Status: Proposed.

Completion: 1960.

• **Pennsylvania Gas Co.**

Project: 23 miles of 10-in. in Erie County, Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa., 30 miles of branch lines, several small distribution lines.

Status: Has FPC permit.

• **Permian Basin Pipeline Co.**

Project: 83 miles of 16-in. from its Spraberry station in Midland County, Tex., to tie in with Pioneer Gathering System, Inc. in northwestern Schleicher County, Tex.

Status: Under way.

Contractor: **Lone Star Constructors,** H. A. (Red) Wylie, supt.

Completion: November 1957.

• **Phillips Petroleum Co.**

Project: 30 miles of 3 to 8-in. in Moore, Hutchinson, Sherman, Hansford, and Gray counties, Tex., and in Texas County, Okla.

Status: Planned.

Contractor: Various.

Completion: January 1, 1958.

• **Piedmont Gas Co.**

Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Carolina to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Status: Has FPC approval.

• **Pioneer Gathering System, Inc.**

Project: 70 miles of mostly 16, 12-in. in Val Verde, Schleicher, Sutton counties, Tex.

Status: Under way.

Contractor: **R. H. Fulton & Co.**

Competion: Early fall 1957.

• **Southern Natural Gas Co.**

Project: 10 miles of 8-in. laterals in Napoleonville Field and Fort Jackson Field, La.

Status: Has FPC approval.

Completion: December 1, 1957.

Project: 32 miles of 6-in. from Chandeleur Sound area, Breton Island, La.; 7 miles of 8-in. and 5 miles of 10-in. from Main Pass area to Olga, La.; 9 miles of 8-in. from Bastian Bay Field to Fort Jackson Field; 7 miles of 8-in. laterals in Manila Village Field.

Status: Has FPC approval.

Completion: December 1, 1957.

Project: 14 miles of 24 and 26-in., 62 miles of 20-in., 48 miles of 16-in., 21 miles of 12-in., 14 miles of 10-in., and 51 miles of smaller lines in La.

Status: Pending FPC approval.

• **Spokane Natural Gas Co.**

Project: 400 miles of 1 through 24-in. distribution system at Spokane.

Status: Under way.

Contractor: **Hallmac Construction Co.;** V. L. Williams, supt., office at Spokane.

Completion: 1957.

• **Tennessee Gas Transmission Co.**

Project: 10 miles of 24-in. loop near New Castle, Pa.

Status: Under way.

Contractor: **Harford Brothers Pipeline Contractors.**

Project: Triple 24-in. underwater crossing of Mississippi River near Greenville, Miss.

Status: Under way.

Contractor: **Pentzien, Inc.,** and **Collins Construction Co.**

Project: 71 miles of 26-in., 10 miles of 20-in., 16 miles of 16-in., and 10 miles of 12-in. gathering lines from near Kinder, La., southward to offshore fields in Gulf of Mexico.

Status: Under way.

Contractor: **Brown & Root, Inc.** has all except for 50 miles of 26-in., C. M. Spears, supt., office at Lake Charles.

Completion: December 1, 1957.

Project: 556 miles of 30-in. from Mississippi Delta area south of New Orleans to Portland, Tenn.

Status: Pending FPC approval.

Project: 76 miles of 24-in. from Coudersport, Pa., to Hamburg, N. Y.

Status: Pending FPC approval.

Project: 163 miles of 30-in. and 101 miles of 26-in. from Portland, Tenn., to near Lancaster, Ky.; from Winchester, Ky., to Morehead, Ky.; from Catlettsburg, Ky., toward Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from Morehead, Ky., to Catlettsburg, Ky.

Status: Pending FPC approval.

• **Texas Gas Transmission Corp.**

Project: 20 miles of 18-in. near Bastrop, La.

Status: Under way.

Contractor: **Houston Contracting Co.,** W. H. Hayes, supt., office at Bastrop.

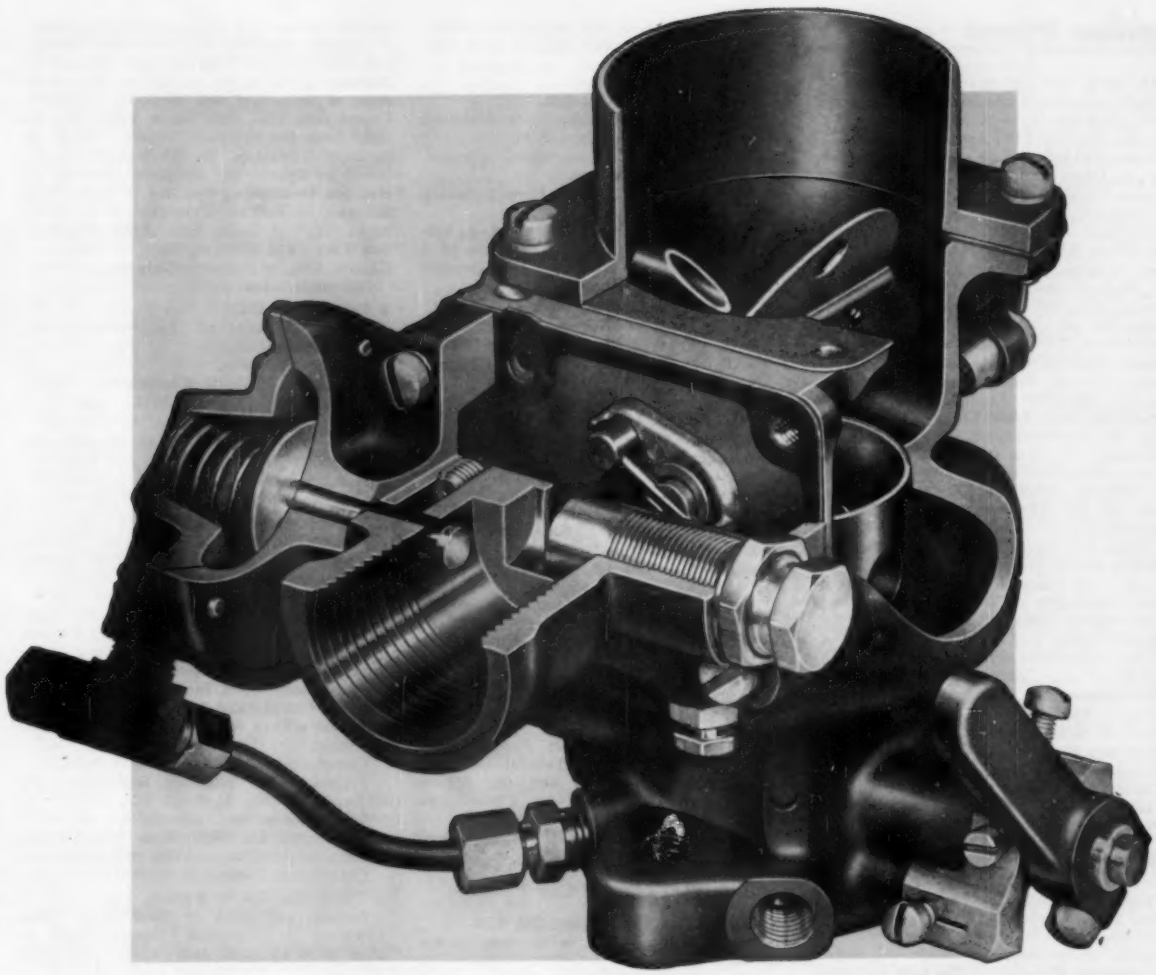
Completion: Fall 1957.

• **Texas Eastern Transmission Corp.**

Project: 17 miles of 8-in. and 3 miles of 6-in. from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas.

Status: Has FPC approval.

Project: 140 miles of 30-in. between Kos-



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Pipeline Patrol

ciusko, Miss., and Uniontown, Pa., 105 miles of 30-in. between Opelousas, La., and Kosciusko, 22 miles of 14-in. supply line in La.

Status: Pending FPC approval.

Project: 667 miles of 30-in. from Kosciusko, Miss., to Uniontown, Pa.

Status: Under way.

Contractor: **H. C. Price Co.** (64 miles from Barton, Ala., to Mount Pleasant, Tenn.; 51 miles from Mount Pleasant to Gladeville, Tenn.; 52 miles from Gladeville to Tompkinsville, Ky.; 68 miles from Tompkinsville to Danville, Ky.; 63 miles from Danville to Owingsville; 46 miles from Owingsville to Wheelersburg, Ohio. Will use four spreads); **Williams Brothers Co.** (63 miles from Egypt, Miss., to Barton, Ala.; 64 miles from Berne, Ohio, to Uniontown, Pa.); **Houston Contracting Co.** (80 miles from Kosciusko to Egypt, Miss., M. L. Thompson, supt., office at Ackerman; 57 miles from Wheelersburg to Athens, Ohio, W. H. Hayes, supt., office at Oak Hill; 61 miles from Athens to Berne, Ohio, R. E. Thornton, supt., office at Chauncey).

Completion: November 1957.

• **Texas Illinois Natural Gas Pipeline Co.**

Project: 44 miles of 36-in. and 4 miles of 34-in. from south of Joliet, Ill., to Howard Street, west of Chicago.

Status: Under way.

Contractor: **Midwestern Constructors, Inc.**, John Work, supt., office at Aurora.

• **Transcontinental Gas Pipe Line Corp.**

Project: 172 miles of 36-in., 68 miles of 30-in., 162 miles of 24-in., and 64 miles of smaller size loops from Tex. to N. J.

Status: Work in North Carolina under way.

Contractor: **Western Construction Co.** has 65 miles of 36-in. and 45 miles of 30-in. at scattered spots along system in S. C., N. C., Pa., and Va. Work will start in N. C., office at Winston-Salem.

Completion: December 1957.

Project: 110 miles of 36-in., 16 miles of 30-in., and 13 miles of 24-in. looping in S. Car., Ga., Ala., Miss., and La.

Status: Under way.

Contractor: **Sharman, Allen, Gay & Taylor, Inc.**, E. D. Singleton, superintendent.

Completion: November 1957.

Project: 57 miles of 30, 36-in. loops in La., Miss., Ala., Ga., S. C., and 247 miles of mostly 24 and 16-in. laterals in Tex. and La.

Status: Under way.

Contractor: **H. B. Zachry Co.** has gathering lines to complete November 1, 1957.

Completion: December 1957.

Project: 87 miles of 24-in. laterals, plus small gathering lines connecting seven Louisiana fields with the New Orleans area.

Status: Pending FPC approval.

• **Trans-Western Pipe Line Co.** (Warren Petroleum, Monterey Oil Co., J. B. Butler.)

Project: A line from Four Corners area to Calif. border.

Status: Proposed.

• **United Gas Pipe Line Co.**

Project: 18 miles of 12-in. from Lirette-Mobile line in Jackson County, south to Bayou Casottee industrial area east of Pascagoula, Miss.

Status: Approved.

Project: 202 miles of 30-in. loop from southeast Louisiana, to Mobile, Ala.

Status: Pending FPC approval.

Canadian Crude-Oil Pipelines

• **Act Oils, Ltd.**

Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Bella Coola, B. C.

Status: Request has been made for permit from the B. C. government.

• **B-A Alberta Pipe Line, Ltd.**

Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.

Status: Pending approval

• **Gibson Petroleum Co., Ltd.**

Project: 25 miles of line from Willesden Green field to near Rimbey, Alta.

Status: Has Alberta Government approval.

• **Pembina Pipe Line, Ltd.**

Project: 100 miles of 3 to 12-in. gathering line in Pembina oil field, Alta.

Contractor: **Universal Pipe Line, Ltd.**, subsidiary of Mannix, Ltd., has 65 miles of 3 to 6-in., Odis Hare, supt., office at Drayton Valley, Alta.

Completion: November 15, 1957.

• **Royalite Oil Co., Ltd.**

Project: 250-mile line from Athabasca oil sands, northeastern Alta., to Edmonton.

Status: Long range plans.

Completion: 1960.

• **Westspur Pipe Line Co.**

Project: 20 miles of 12-in. from Alida in southeastern Saskatchewan, to the Carnduff Glen Ewen area to tap Cantal, Hastings Florence, Carnduff, and Glen-Ewen fields. 34 miles of 4, 6, 8-in. gathering lines.

Status: Has requested permit from Board of Transport Commissioners.

Contractor: **Majestic Contractors, Ltd.** Jeff Minter, supt., office at Estevan, Sask.

Completion: No date set.

Canadian Products Pipelines

• **Hydrocarbons Pipeline Co.**

Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.

Status: Has permit from Parliament of Canada. If approved by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board, work will start in 1957.

Construction consultants: **Dutton-Williams Brothers, Ltd.**, and **A. D. Little Co.**

Canadian Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co., Ltd.**

Project: 637 miles of 34 to 16-in. gathering lines in Alberta.

Status: Under way.

Contractor: **Dutton-Williams Brothers, Ltd.** has preliminary studies, design and management-engineering. **Universal Pipe Line, Ltd.** subsidiary of Mannix, Ltd., jointly with **Marine Pipeline & Dredging Co.**, has crossing of Red Deer River near Cavendish, Alta., J. Hysuick, spread superintendent, office at Empress. **Fulton Banister, Ltd.**, has completed 17 miles of 34-in. west from Burstall, Sask., to near Cavendish, Alta., and 100 miles of 18-in. north to Bindloss and Provost fields.

• **Alberta & Southern Transmission Co., Ltd.**

Project: Line from Alberta to San Francisco area plus 47 miles of gathering lines.

Status: Planned.

Completion: October 1958.

• **Goliad, Ltd.**

Project: 28 miles of 4, 8-in. in Pembina field.

Status: Under way.

Contractor: **Henuset Brothers, Ltd.**

Completion: November 30, 1957.

• **North Canadian Oils, Ltd.**

Project: 47-mile extension into Jasper, Alta., of its 10-in. line from Wabamun to Hinton west of Edmonton.

• **Northern Ontario Pipe Line Crown Corp.**

Project: 675 miles of 30-in. from the Ontario-Manitoba border to near Kapuskasing, Ont. (part of the 2,250-mile Trans-Canada line; will be leased to Trans-Canada Pipe Line Co. with option to buy.)

Status: Under way.

Contractor: **Dutton Williams Brothers** has 58 miles from the Manitoba-Ontario border west of Kenora to a point east of the crossing of Ontario Highway 17. **Morrison Shivers, Ltd.** has 94 miles from the east crossing of Highway 17 to a line separating the townships of Hyndman and Hodgson. **Majestic Contractors, Ltd.**, and **Nelen, Ltd.**, have 80 miles from the Morrison Shivers terminal to Stedman Township, W. B. Williams, supt., office at Ignace, to complete October 31. **Houston Contracting Co.** has 79 miles from Stedman to Forham Township, R. L. Silar, supt., office at Raith, Ont. **River Construction Corp.**, has Winnipeg River crossing near Kenora, Ont., to complete November 15, 1957.

Completion: End 1957.

• **Ottawa Gas Co.**

Project: 36 miles of 12-in. from Morrisburg to Ottawa, Ont.

Status: Under way.

Contractor: **Majestic Contractors, Ltd.**

Completion: Before end 1957.

• **Quebec Natural Gas**

Project: 34 miles of 16 to 24-in. across center of Island of Montreal.

Status: Under way.

Completion: November 15, 1957.

• **Trans-Canada Pipe Lines, Ltd.**

Project: 310 miles of 20-in. from Toronto to Montreal, 33 miles of 24-in. from Toronto to Niagara, N. Y.

Status: Under way.

Contractor: **Oklahoma Pipe Line Constructors** (83 miles of 20, 24-in. from Toronto to Whitby, Ont., Lemon Crech, supt., office at Brampton, to complete November 1, 1957); **Grayco Constructors, Inc.** (120 miles of 20-in. between Toronto and Montreal). **Dutton Williams Bros.** (114 miles between Toronto and Montreal).

Completion: Late 1957.

Project: 30-in. Winnipeg River dual line at Kenora, Ont.

Status: Under way.

Contractor: **Canadian River Construction**, Vernon Gayhart, supt., office at Kenora, Ont.

Completion: November 15, 1957.

• **Union Gas Co. of Canada, Ltd.**

Project: 142 miles of 26-in. from Dawn Township to Hamilton, Ontario, plus 55 miles of 6 to 20-in. laterals, and 317 miles of 2 to 12-in. distribution lines.

Status: Under way.

Contractor: **Canadian Bechtel, Ltd.** has the 26-in. line with 2 spreads working: J. L. Work, supt., office at Galt, H. F. Mogg, supt., office at Strathroy.

Completion: November 30, 1957.

• **Westcoast Transmission Co., Ltd.**

Project: 42 miles of 20-in. and 100 miles of 30 in. from Savanna Creek area, Alta., to Canadian-Idaho border.

Status: Planned.

Completion: November 1, 1958.

Project: 150 miles of 4 through 26-in. gathering lines at Fort St. John, B. C.

Status: Under way.

Contractor: **Canadian River Construction**, E. L. (Tex) Maggard, supt., office at Dawson Creek.

Completion: October 31, 1957.

Project: Looping of present system to double capacity.

Status: Planned.

Foreign Crude-Oil Pipelines

• **Assam Oil Co.**

Project: 600 miles of 0-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.

Status: Survey of possible routes under way.

Contractor: **Pipe Line Engineering Co.** is making survey.

• **Bolivian Gulf Oil Corp.**

Project: 160 miles of 10-in. and 43 miles of 8-in. from Sicasica to Arica on the Chilean coast.

Pipeline Patrol

Status: To start late 1957.
Contractor: **Williams Brothers Co.**
Completion: 1958.

• **Bolivia-Paraguay**
Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.
Status: Planned.
Contractor: Five Lilles, a French Combine.

• **Burmah Oil Co., Ltd.**
Project: 250 miles of 30-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.
Status: Survey under way.
Contractor: **Collins Construction Co.** is surveying locations for some 40 river crossings.

• **Caltex**
Project: 30 miles of 30-in. from Duri field in Sumatra to Dumai where a deepwater terminal will be built. Line will be extended 35 miles to Minas field later.
Status: Planned.
Completion: Duri-Dumai line to be finished in 1959; extension to Minas later.

• **Colombian Petroleum Co.**
Project: 42 miles of 6-in. from Tibu field to Rio de Oro in Colombia.
Status: Under way.

• **C.R.E.P.S., Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN Repal), and Cie. Francaise des Petroles Algerie**
Project: Two 10-in. lines from Hassi Messaoud and Edjele, Algeria to the railhead at Touggourt.
Status: Planned.
Completion: 1958.
Project: 450 miles of 16-in. from Edjele field in southeastern Algeria to a Mediterranean port on the Libyan coast.
Status: Pipe has been ordered.

• **Creole Petroleum Corp.**
Project 100 miles of 30-in. from Temblador field to Caripito in Venezuela.
Status: To start work early 1958.
Contractor: **Pipe Line Engineering Co.** and **Oklahoma Pipe Line Constructors**, R. J. O'Connell, supt., office at Maturin.
Completion: April 30, 1958.
Project: 9 miles of 26-in. from Ule to La Salina in Venezuela.
Status: Planned.
Completion: Late 1957.

• **Deutsche-Shell A.G.**
Project: 120 miles of 20, 24-in. from Marseilles, France, to Rotterdam, Germany, to tap the 700 mile trans-Europe line proposed by the Royal Dutch-Shell Group.
Status: Planned.
Completion: 1960.

• **Iraq Petroleum Co.**
Project: About 600 miles of up to 40-in from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.
Status: Proposed. Survey completed.

• **Mene Grande Oil Co.**
Project: 97 miles of 30-in. from fields in Eastern Venezuela to Puerto La Cruz.
Status: Under way.
Contractor: **Fulghum Contracting Corp.** has 22 miles between Oficina and Anaco.
Completion: First quarter 1958.
Project: 45 miles of 24-in. from Oficina to Melones, Venezuela.
Status: Planned.
Completion: First quarter 1958.

• **Middle East Pipeline**
Project: 1,500 miles of 38 and 40-in. line from Persian Gulf to Mediterranean at Iskenderun, Turkey.
Status: Proposed.

• **National Iranian Oil Co.**
Project: A 1,000-mile 38-in. line to move Qum crude to the Mediterranean.
Status: Transit agreement approved. Allen & Co. of New York City will finance project.

• **North-West Oil Pipeline Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N.J.), and British Petroleum Co., Ltd.)
Project: 230 miles of 28-in. from refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven
Status: Work to start early 1958.
Completion: November 1958.

• **Royal Dutch-Shell**
Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through Eastern France, Luxembourg, West Germany, and Netherlands, and Belgium. Main trunk to be 30-in.
Status: Company is considering project together with several other companies.

• **Standard-Vacuum Petroleum Maatschappij.**
Project: 94 miles of 8-in. from Lirik field, Central Sumatra, to deep-water terminal on Siak River, near Buatan. A 3-in. hot-water "defroster" line will be laid under the 8-in. to heat the heavy crude.
Status: Under way.
Completion: Late 1957.

• **Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie**
Project: Line in Sahara Desert area to move oil from Hassi Massaoud field. Two routes possible: 200 miles from the field northwest to Laghouat; 260 miles from the field to the north and slightly east to Biskra.
Status: Under study.

• **Union of Soviet Socialist Republic**
Project: 2,300-mile Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Balkal.

• **Yacimientos Petrolifferos Fiscales** (Argentina)
Project: 932 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Planned.
Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.
Completion: Mid-1960.

Foreign Products Pipelines

• **Empresa Nacional de Petroleos** (Government of Chile) and **Cia. de Petroleos de Chile (Copec), et al.**
Project: 75 miles of 10-in. from Chile's coastal refinery at Concon to Santiago.
Status: Under way.
Contractor: **Williams Brothers**
Completion: Early 1958.

• **Israeli Government**
Project: A 6-in. line from the Haifa refinery to Tel Aviv.
Completion: Late 1957.

• **Mene Grande Oil Co.**
Project: 60 miles of 6-in. L.P.G. line from Anaco to Puerto La Cruz, Venezuela.
Status: Planned.
Completion: Fourth quarter 1957.

• **North Atlantic Treaty Organization**
Project: 2,000 miles of lines to airfields in parts of Europe.
Status: Under way.
Contractor: **Associated Pipeline Contractors, Inc.** (450 miles from Iskenderun, Turkey to Batman); **TECHINT** (205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir).

Foreign Natural-Gas Pipelines

• **Attock Oil Co.**
Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
Status: Planned.

• **Cuban Gas Transmission Co.**
Project: 650-mile pipeline from Campeche area of Mexico across Yucatan and on the ocean floor to Havana, Cuba; 150 miles would be submarine.
Status: Being studied by Ebasco Services.

• **Gaz de France**
Project: 550 miles of 16 to 24-in. from Lacq field, southwestern France, to Paris, plus a 10-in. lateral to Nantes and 12 to 16-in. laterals to Lyons, making a 1,000-mile system.
Status: Under way.
Contractor: French contractors.
Completion: First stage in 1958; complete system in 1960.

• **NIOGAS**
Project: 160-mile, 6, 8, 10, and 12-in. line from Fischamend field to Vienna and other Austrian cities.
Status: Under way.
Contractor: **Williams Brothers** and **Costain-John Brown.**
Completion: Fall 1958.

• **Petroleos Mexicanos**
Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.

• **Sui Gas Transmission Co.**
Project: 217 miles of 16-in. from Sui gas field to Moultan, Pakistan.
Status: Under way; to be extended later to Lahore with branches at Kot Addu, Jhang, Magiana, and Montgomery.
Contractors: **Pakistan Constructors**, a joint company of **Morrison-Knudsen** of Boise, Idaho, and **William Press, Ltd.**, of London.
Project: 145-mile line from Sylhet to Dacca, East Pakistan.
Status: Under consideration. If approved construction could start December 1958.

• **Technical Office of Hydrocarbon, Ministry of Mines and Petroleum, Government of Venezuela.**
Project: 207 miles of 26-in. from Anaco fields to Caracas.
Status: Under way.
Contractor: **Fulghum Contracting Corp.** will be consultants; **Petrogas, S. A.** will engineer and construct the line.
Completion: Spring 1959.

• **Union of Soviet Socialist Republic.**
Project: 808 miles of 26-in. from Stavropol in the Northern Caucasus to Moscow, to serve Voroshilovgrad, Voronezh, Tula, Yeleta, and Serpukhov.

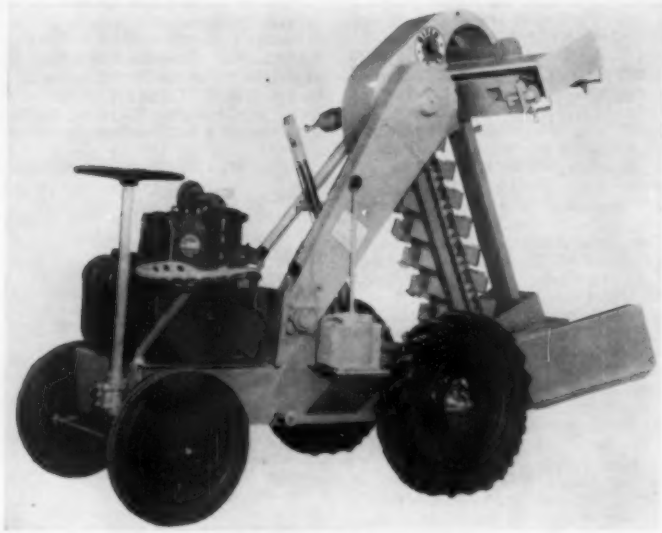
• **Yacimientos Petrolifferos Fiscales (Argentina)**
Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.
Status: Planned.
Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).
Completion: Mid-1960.

"You serious about wantin' a couple of days off?"

THE OIL AND GAS JOURNAL

SHOWCASE...

NEW EQUIPMENT



New Machine Digs at 8 Ft. Per Minute

Service lines and footings are easy to dig with this new Model LD Ditch-Witch trencher, the maker says.

Trench widths are from 4 to 16 in. at 2-in. intervals. The machine will dig a 4 or 6-in. trench to a depth of 42 in. About 6 in. less depth is obtainable for each additional 2-in. width of trench.

The trencher is powered by an 18-hp. air-cooled engine. It has an automotive type of steering and transmission with three speeds forward and reverse. The spoils conveyor is reversible, and a double-acting hydraulic pump raises the bucket line. **Write or call: Charles Machine Works, Inc., Perry, Okla., for details on Model LD trencher.**

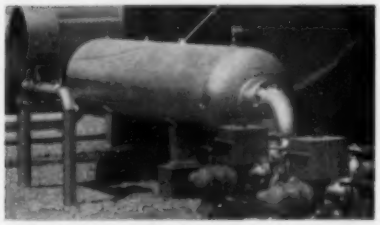
●

Synthetic Detergent Cleans Variety of Equipment

Fast cleaning of a variety of equipment in refineries and gasoline plants as well as on drilling rigs can be quickly done with this new heavy-duty synthetic detergent, the maker indicates. It can be used to clean pipe, pumps, power plants, and other equipment.

Called RW Rig Washing Compound, the detergent reportedly provides fast cleaning using hard, soft, or cold water. Easy to use, it is never hard on painted surfaces or on the workers' hands, the maker reports. **Write or call. Proctor & Gamble Distributing Co., P. O. Box 599, Cincinnati, Ohio, for details on RW Rig Washing Compound.**

●



Pulse Trap Stops Pulsation in Liquid, Gas

This new pulse trap reduces pulsations in hydraulic systems, oil lines, and gas or refrigerant piping, according to the maker. In operation, the pulse trap reportedly utilizes a divided-flow principle which attenuates the pulsations. It cancels the pulsation of two divided streams by forcing them out of phase.

The device was developed to eliminate pulsation in liquid lines caused by reciprocating pumps. It is suited for use on triplex, duplex, and radial-piston pumps, the maker says.

The pulse trap for liquid lines employs no gas chambers, synthetic rubber sacks, or similar devices. Instead, it relies on the elastic properties of the liquid.

The pulse trap for gas service uses the same construction as the model for liquids with modifications. It's applicable to compressor stations and for the elimination of differential meter errors, the maker reports.

The pulse trap is custom built in all sizes. The pressure vessels are built to meet code requirements. Standard sizes of the pulse trap for liquids are available for installation on the discharge of radial-piston pumps with capacities of 10 to 45 g.p.m., pressures to 5,000 psi., and speeds to 1,150 r.p.m. and

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NAME AND/OR MODEL NUMBER.....

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Described in OIL AND GAS JOURNAL - Issue of October 28, 1957

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

DATE.....

New Equipment

on the discharge of triplex plunger pumps with capacities from 10 to 45 g.p.m., pressures to 3,000 p.s.i., and speeds to 400 r.p.m. **Write or call: Pulsation Controls Corp., P.O. Box 169, Santa Paula, Calif., for details on pulse trap.**

●

Differential-Pressure Transducer Takes Pressures to 5,000 Psi.

Low differential pressures at line pressures up to 5,000 psi. can be measured with this new magnetic-reluctance pressure transducer, the maker says. The transducer is offered in full-scale ranges from 3 in. of water up to 500 psig. Static and dynamic pressure measurements are accurate to within ±1 per cent of full scale, according to the maker.

Indicating, recording, and control systems compatible with inductance ratio-input devices may be used with the Model P3D instrument.

The pressure-sensing element is a diaphragm. It's magnetically coupled to a pickoff system embedded in the body, resulting in mechanical rigidity and the ability to measure high-frequency components of pressure transients.

Mildly corrosive liquids and gases may be admitted directly to both sides of the transducer without the necessity for fluid isolation.

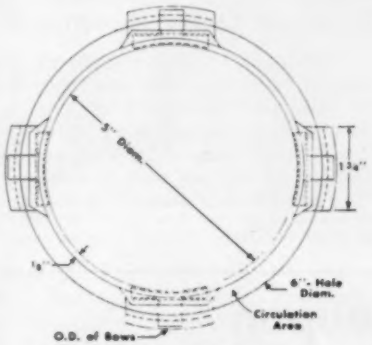
Other features include symmetrical, Type 416 stainless-steel construction, low-pressure-chamber volume, and positive overload protection in both directions. The instrument weighs 2 lb. It is about 1⅜ in. square and 2¼ in. long. **Write or call: Pace Engineering Co., 6914 Beck Avenue, North Hollywood, Calif., for details on Model P3D pressure transducer.**

Automatic Totalizer Handles Many Jobs

The Series 24 Automatic Totalizer shown here is an automatic predetermined counter. It offers many applications in automatic-control processes where high speed and accurate repeatable control is necessary, the maker says. It will separate fluids into batches, metering the desired quantity, and stop or divert flow.

In addition, it will measure predetermined lengths. It fits any counting or measuring application where the information can be supplied in pulse form.

Operating directly either from a photoelectric cell, a magnetic pickup coil, or a mechanical transducer, the device does not require an amplifier. It's easily set to the number to be controlled. And it will give a continuous indication of the number of batches or cycles completed and an accumulated total number of counts with a carryover from batch to batch. It will also indicate the remaining number of counts to complete any batch. The totalizer consists of a four-decade decimal predetermined pulse counter with two selectable decimal-divider stages incorporated ahead of the counter. These permit the selection of a predetermined count between 1 and 999,900 to four significant figures. **Write or call: Potter Aeronautical Corp., Union, N. J., for details on Model 24 Totalizer.**



3" B and W LINER CENTRALIZER

Liner Centralizer Speeds Liner Runs

Friction can be reduced in holes of reduced clearances to allow successful running of liners to the bottom with this new B & W liner centralizer, the maker reports. The device combines high strength, streamlined construction, a large circulation area, and a means of positive attachment without welding to the casing. Increased circulation area is achieved by a lower integral stop collar of special design, the maker says. **Write or call: B & W, Inc., P. O. Box 5266, Houston 12, Tex., for details on liner centralizer.**

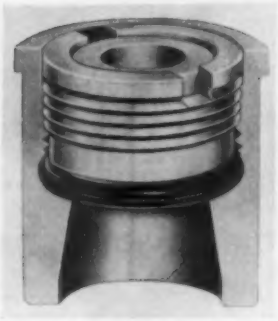
Threaded Flow Nozzle For Jet Rock Bits

Here's a new threaded flow nozzle for use in three-cutter jet rock bits. It's reported to be thoroughly tested and proved by the manufacturer.

The new nozzle is designed to permit fast and easy installation or replacement in the field. Instead of the customary knockout rod, pliers, and gage

SHOWCASE . . .

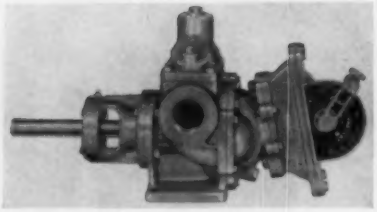
New Equipment



bar, only a single wrench is needed to install the nozzle or remove it.

An O-ring in the unitized assembly is compressed as the threaded flow nozzle is screwed tight. The compressed O-ring thereafter acts as a shakeproof elastic stop nut to prevent backing out of the nozzle while it is run into the hole. During the drilling operation, fluid pressure on the O-ring locks the nozzle and retainer in place.

The assembly is so constructed that neither turbulence during drilling nor backwash while running in the hole can create sufficient fluid erosion to cause failure or loss of the threaded nozzle, the maker says. This new development is expected to give positive assurance against loss of nozzles by eliminating both the chance of human error in installation and mechanical failure during operation. **Write or call: H. C. Smith Tool Co., P. O. Box 431, Compton, Calif., for details on threaded flow nozzle.**



Variable-Capacity Pump Can Be Adjusted Quickly

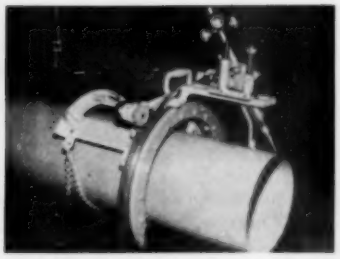
Simply changing the dial setting on this new Vari-Cap pump changes its capacity to suit the product being pumped, the maker reports. No slide-rule calculations or gear changers are necessary.

According to the maker, the metering pump can be ideally used for blending and processing such products as fuel oil, caustics, and additives. Pump speed can be adjusted to handle products of varying viscosities. The operation can be powered from standard-capacity motors and the differential taken up in the pump's adjustment. The range of adjustment is from zero to 40 g.p.m. at 500 r.p.m. **Write or call: Granberg Corp., 1308 Sixty-seventh Street, Oakland 8, Calif., for details on Vari-Cap pump.**

●

Pipe-Beveling Attachment Increases Cutting Accuracy

Now available is this improved design in the out-of-round attachment for H & M pipe-cutting and beveling machines. It works on a spring-tension principle. A spring and a roller rod assembly are the two main components. The attachment is designed to eliminate



inaccurate cuts or bevels on out-of-round or otherwise imperfect pipe.

The roller rod assembly consists of two parts. The first is a rod fastened to the body of the attachment by a set-screw arrangement. The second part is a small-diameter wheel affixed to the end of the rod. The wheel travels over the outer circumference of the pipe surface. Through the action of the spring, constant pressure from the spring on the roller rod forces the wheel to follow the pipe contour. This action keeps the torch equidistant from the pipe, correcting for any defects in its surface, the maker says. **Write or call: H & M Pipe Cutting & Beveling Machine Co., 311 East Third, Tulsa, Okla., for details on out-of-round attachment.**

●

Shrinkage Tester May Eliminate Guesswork

Gas-distillate producers may find this new shrinkage tester highly valuable. It's designed to accurately measure the shrinkage of liquid hydrocarbons occurring when separator pressure is reduced to storage-tank pressure. The maker says the device eliminates the need for guessing at the amount of shrinkage occurring when liquid is discharged from a separator into a storage tank.

The vessel connects to the oil-and-gas separator. Liquid hydrocarbons from the separator fill the shrinkage tester to a preset volume. Then the tester is isolated from the separator and

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Described in OIL AND GAS JOURNAL - Issue of **October 28, 1957**

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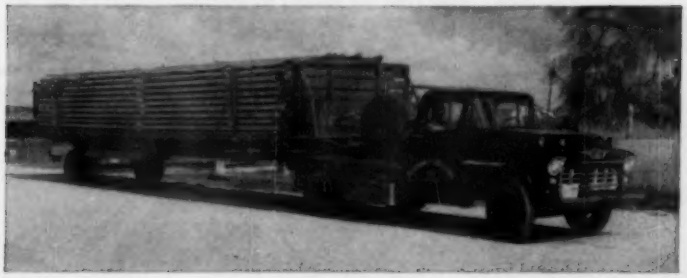
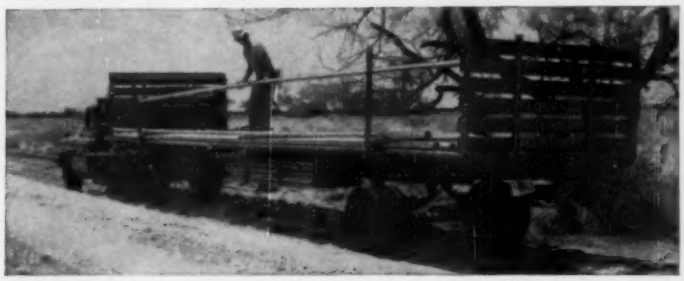
BIGGER TRUCKLOADS—This rig carries 10,000 ft of 2½" Schedule 5 Alcoa Aluminum pipe. The light weight of Alcoa Aluminum makes it easy.



SAVE MONEY 3 WAYS WITH PORTABLE PIPING OF ALCOA ALUMINUM



SMALLER CREWS—One man—unassisted—easily handles standard length of Alcoa Aluminum Pipe with coupler.

FASTER LAYING—Light weight and handling ease—plus quick couplings of aluminum—speed laying of Alcoa Aluminum Pipe. Pick-up and relaying is just as easy.

The rugged durability of Alcoa® Aluminum Pipe saves extra dollars, too . . . through long, maintenance-free service. Its corrosion resistance is unmatched, and it stands up under the abuse of laying or stringing over the roughest terrain.

Alcoa Aluminum Pipe and quick couplings of aluminum are available in quantity through a nationwide distributor network . . . listed under "Pipe" in the Yellow Pages of your telephone directory. Get complete details from your nearest distributor . . . or use the handy coupon. *For information on overseas distribution, contact Alcoa International, Inc., 230 Park Avenue, New York 17, New York.*

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☐ I need low cost, portable piping for: _____

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Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

New Equipment

pressure slowly reduced to the desired value. Time is allowed for stabilization. Then the per cent of shrinkage resulting from pressure reduction can be read directly from a calibrated scale on the tester.

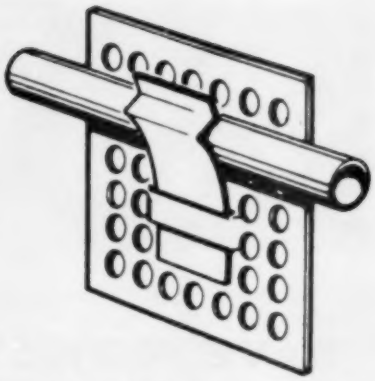
The shrinkage factor thus obtained can be used to convert metered volume under pressure to net stock-tank volume at atmospheric pressure. **Write or call: Oil Metering & Processing Equipment Corp., 4843 Yale Street, Houston 18, Tex., for details on shrinkage tester.**

●

Tubing Spring Clip Now Comes in Larger Size

A larger size (⅜-in.) of this tubing spring clip is now available. The clip is handy for holding conduit, wiring, cable, hose, or flexible metal tubing to ducts, ductwork, and building surfaces.

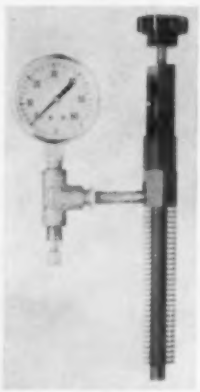
The larger size allows use of larger-diameter wire and tubing materials, the maker points out. It has the same holding qualities as the smaller (¼-in.)



size. It reportedly eliminates surface drilling or punching of metal or masonry surfaces.

The application of the adhesive-covered spring clip to a surface base is all that is required to attach it. The adhesive bond increases to a maximum tested holding strength of 75 lb. per clip. **Write or call: Stic-Klip Mfg. Co., 500 Regent Street, Cambridge 40, Mass., for details on tubing spring clip.**

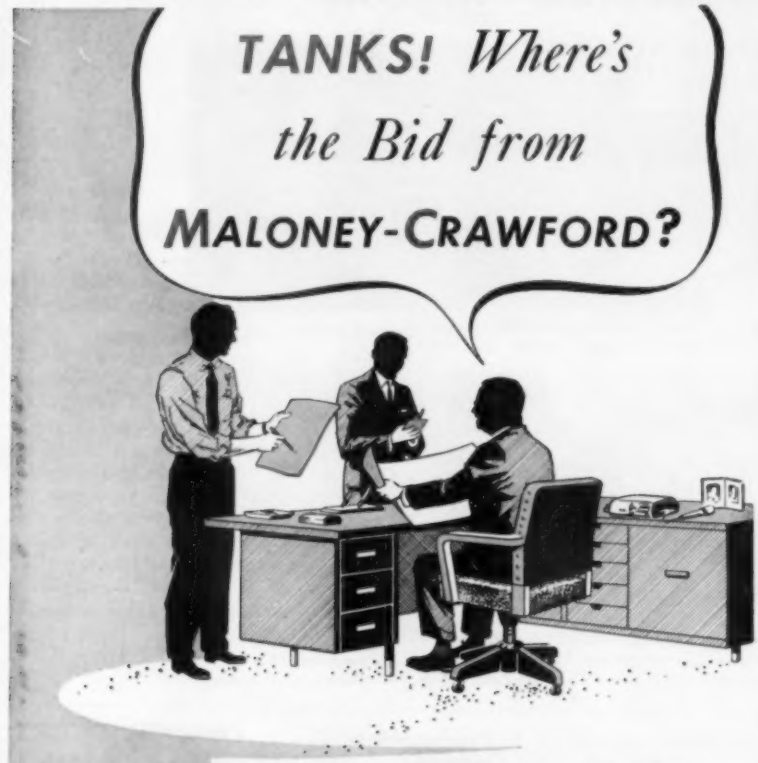
●



Vaporizing Valve Controls Expansion

Here's a new vaporizing valve for controlling expansion of vapors in refineries and petrochemical plants. The Model I valve permits controlled expansion of condensable vapors with volume expansions up to several thousand to one while maintaining intimate thermal contact with room ambient temperature, the maker claims. Condensation is minimized or prevented entirely. The radial input aperture is controllable in microinches.

Units with electric heaters and for automatic control also are available. Input pressures in all units can be up to several hundred pounds per square inch. Regular materials of construction are brass and Type 316 stainless steel. **Write or call: Manufacturers Engineering & Equipment Corp., Hatboro, Pa., for details on Model I vaporizing valve.**



TANKS • SEPARATORS • HEATERS • TREATERS
DEHYDRATORS • DESULPHURIZERS • PRODUCTION UNITS

MALONEY-CRAWFORD
TANK AND MANUFACTURING COMPANY
38 NO. PEORIA TULSA, OKLAHOMA

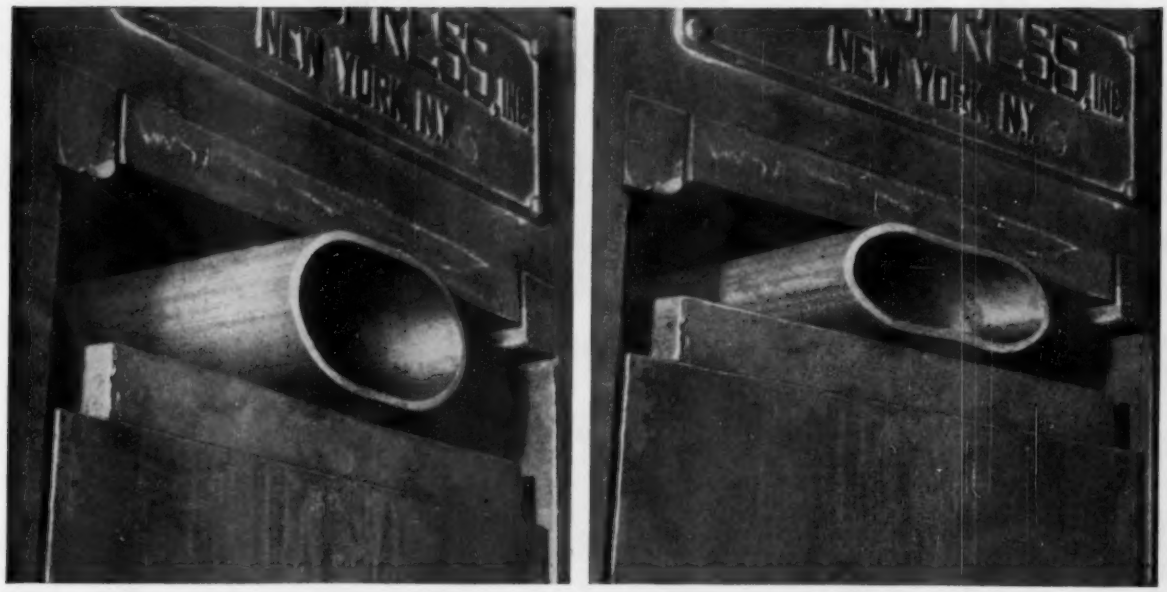
CANADIAN DISTRIBUTOR: Maloney-Crawford Tank & Service Co.
Calgary, Alberta, Canada

EXPORT: Baird Lines
1037 Grand Central Terminal Bldg.
New York City, New York

MC 1909

OIL WELL ENGINEERED

DUCTILITY



MAKES THE DIFFERENCE

when Kaiser Pipe meets the press!

ONLY the soundest welds, joining an extremely ductile steel, could stand the strain of the pipe-flattening test shown here.

We know, of course, that no electric weld pipe would ever be subjected to such rigorous conditions in the field.

Still, at Kaiser Steel we want to be *sure*.

So—52 times along the way from iron ore to finished pipe—we run exhaustive tests to keep the quality high.

We measure our pipe's strength and ductility. We inspect it thoroughly for roundness... concentricity... accuracy of dimension.

Thus, when you specify electric weld pipe from Kaiser Steel, you can be *certain*. Certain of performance to match your most exacting demands. Certain, too, of service when and where you need it.

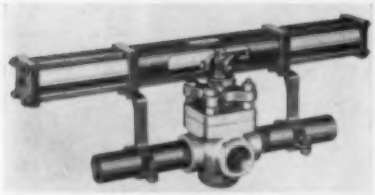
Kaiser Steel

built to serve the growing West

Steel Mill Products: plates • hot rolled strip and sheet • cold rolled strip and sheet • tin plate • continuous weld pipe • electric weld pipe • alloy and carbon bars • bar shapes • structural shapes semi-finished steels • pig iron • ingot molds • coke by-products • **Fabricating Division:** steel fabrication for construction, aircraft, missile and other industries • expanded fusion weld pipe reinforced concrete pipe • tanks • For specifications, write: **KAISER STEEL CORPORATION** • Los Angeles • Oakland • Seattle • Portland • Phoenix • Denver • Tulsa • New York

SHOWCASE . . .

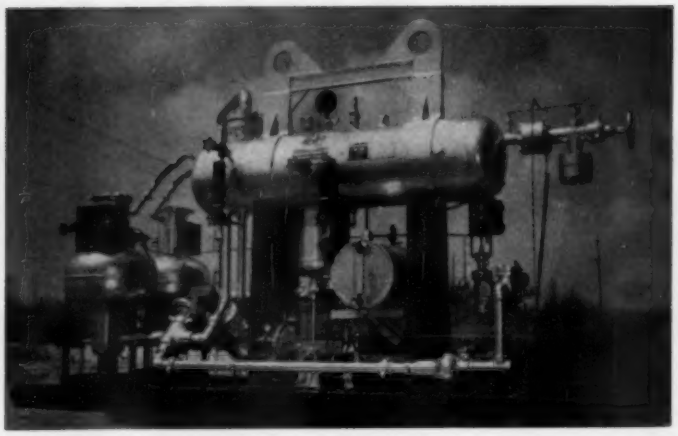
New Equipment



Plug-Valve Operator Adapts to Several Jobs

This plug-valve operator is designed for use with air, gas, oil, or water at pressures up to 200 psi. It's adaptable to a wide range of control requirements. These include process cycling, safety and automatic shutoff, or combinations. Three models are available—FM, TM, and QM.

Bonnet and flange type of valve-mounting brackets are available too. Several control valves can be obtained for automatic or remote operation of the valve operator. **Write or call: Ledeen Mfg. Co., 3350 North Gilman Road, El Monte, Calif., for Bulletin 3040.**



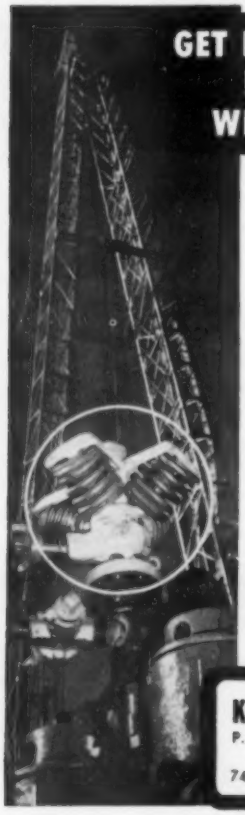
Skid-Mounted Tester for Offshore Wells

The problem of checking the production of offshore oil and gas wells may be solved through the use of this new skid-mounted well checker specifically designed for marine work. The unit separates and meters oil, water, and gas.

In addition to being advantageous in checking production of new wells, the portable well checker can easily be installed to analyze established producers, the maker reports.

The unit can easily be transported by service boat or barge to offshore installations. It is equipped with a special lifting mechanism that facilitates movement from the barge to the platform.

An outstanding feature is a methyl-alcohol injection system for injecting a hydrate inhibitor upstream of the inlet choke. The adjustable inlet choke is a high-pressure device. **Write or call: Rolo Mfg. Co., Box 6763, Houston 5, Tex., for details on offshore well checker.**



GET PRESSURE RELIEF PROTECTION WITH KINZBACH

The Model 112 Kinzbach Automatic Pressure Relief Valve for Mud Pumps gives positive, instantaneous pressure relief at maximum volume and automatic restoration of circulation upon correction of the overpressure condition. All elements of the circulating system are protected from excessive pressure at all times.

Services utilizing extremely high pressures such as acidizing, cementing and fracturing find the Model 112 meets their safety requirements.

Kinzbach Model 112 Pressure Relief Valves come in 2" and 3" sizes and pressures ranging from 500 psi to 16,500 psi. Write for complete catalog or see your Composite Catalog.

KINZBACH TOOL CO.

KINZBACH TOOL CO., INC.
P. O. BOX 277 • HOUSTON, TEXAS
EXPORT OFFICE:
74 TRINITY PLACE, NEW YORK, N. Y.

We are pleased to announce that

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is now associated with our firm.

LEHMAN BROTHERS

5 Peerless Pump Designs

PEERLESS PUMPS

that squarely meet every

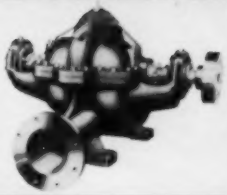
LIQUID HANDLING REQUIREMENT

THESE ARE THE *Pumps*

ASK FOR *FREE* ENGINEERING BULLETINS

TYPE A AND TYPE AS GENERAL PURPOSE PUMPS

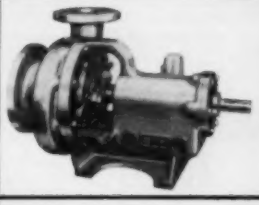
Use these pumps in the widest range of water handling services. Single stage, horizontal split case design. Mechanical shaft seal construction available in sizes up to 4" (Type AS). Heads: up to 300 ft.; capacities up to 70,000 gpm.



Ask FOR BULLETIN B-1300 & B-1350

TYPE DL AND DM CHEMICAL PROCESS PUMPS

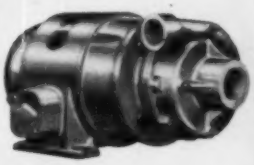
Combine quality with economy through a practical idea of component interchangeability between pump types. Oil and grease lubricated bearing housings. Packing gland or shaft seal designs. Air or water cooled back plates. Heads to 430 feet; capacities to 800 gpm. Pressures to 400 psig.



Ask FOR BULLETIN B-1608

TYPE PE AND TYPE PB END-SUCTION PUMPS

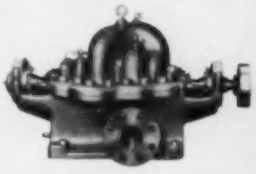
America's broadest line of economical, general purpose pumps. Horsepower range from ¼ to 150. Head range to 260 ft. Capacities up to 5500 gpm. Easy to buy, apply, install and maintain. Tens of thousands in use.

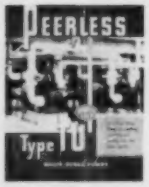


Ask FOR BULLETIN B-2300

TYPE TU AND TYPE TUT MULTI-STAGE PUMPS

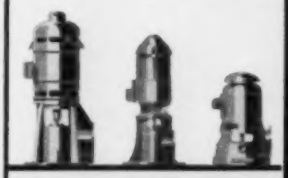
2,3,4 and 5-stage designs for supplying, circulating and boosting water and other liquids in moderate capacities against medium and high heads. Durable and dependable in operation. Heads up to 1660 feet; capacities up to 3000 gpm.





Ask FOR BULLETIN B-1400

VERTICAL INDUSTRIAL SERVICE PUMPS Heavy duty, extra heavy duty and process service types for application to cooling tower service, tank pumping, etc. One of the proudest lines manufactured. Save on piping, always primed, require minimum floor space. Heads to 1000 feet; capacities: 30 to 40,000 gpm. HP range: up to 2500 h.p.



Ask FOR BULLETIN B-505

MAIL COUPON FOR ILLUSTRATED BULLETINS

PEERLESS PUMP DIVISION

FOOD MACHINERY AND CHEMICAL CORP

Factories: Los Angeles, Calif., and Indianapolis, Ind.
Offices: New York; Atlanta; Chicago; St. Louis; San Francisco; Phoenix; Fresno; Los Angeles; Plainview and Lubbock, Texas; Albuquerque, New Mexico.
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PEERLESS PUMPS

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- ☐ Type A Bulletin B-1300
- ☐ Type AS Bulletin B-1350
- ☐ Type DL-DM Bulletin B-1608
- ☐ Type PE-PB Bulletin B-2300
- ☐ Type TU Bulletin B-1400
- ☐ Vertical Types Bulletin B-505

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SHOWCASE . . .

New Literature

Steam Jet Exhausters and Compressors. Eight-page Bulletin 4E describes Schutte & Koerting's exhausters. These are air and gas pumps which operate on the jet principle at moderately high vacuum using live steam or air as the motive force. The bulletin includes application, construction, and operation information on the various types and sizes manufactured, including those for laboratory applications and for use in chemical service. Capacity curves, capacity ratios, and steam and air consumption tables make it possible to determine easily the type and size exhauster needed to meet operating requirements. **Write or call: Dept. JA-2, Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa., for Bulletin 4E.**

●

Column Packings for such processes as absorption, scrubbing, distillation, and drying are presented in this group of three new bulletins. They cover Panapak, Goodloe, and Stedman packings. Each bulletin describes and illustrates with photographs the packing covered and then explains tests made on the packing and the test results. Tables summarize the important data obtained from the tests. A bibliography on the back cover of each bulletin gives the literature cited. **Write or call: Packed Column Corp., 30 Church Street, New York 7, N. Y., for bulletins on Panapak, Stedman, and Goodloe column packings.**

●

Package-Unit Electric Substations. Eight-page Bulletin SD-61 describes and pictures package substations with capacities from 75 to 500 kva., three-phase. The units have primary voltages up to 4,800 volts and secondary voltages up to 600 volts. The bulletin explains the advantages which substations offer when used in modern electrical systems and shows a complete line of Square D equipment designed to meet the needs imposed by modern systems. **Write or call: Square D Co., Dept. SA, 6060 Rivard Street, Detroit 11, Mich., for Bulletin SD-61.**

●

Temperature Conversion Chart. This handy pocket-sized chart contains easy-to-read tables of Fahrenheit and Centigrade temperature equivalents for converting from one temperature to the other. The reverse side of the 8½ by 3½-in. chart illustrates by means of an animated demonstration the easy-reading qualities of thermometers made with a Moeller glass red-reading column. **Write or call: Moeller Instrument Co., Richmond Hill 18, N. Y., for temperature-conversion chart.**

●

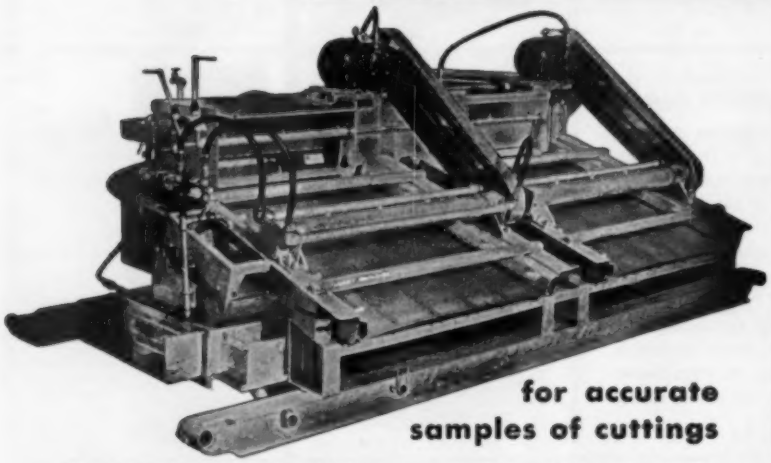
Design and Cost Comparison of Heat Exchangers, using Wolverine Trufin is the subject of this new 20-page booklet. Expected to be of assistance to engineers, estimators, and designers, it gives a rapid analysis of the comparable costs between a plain condenser tube and a Trufin Type S/T shell-and-tube exchanger over the range of the more common applications. The booklet also explains what Trufin is and where it is used. **Write or call: Wolverine Tube Div., Calumet & Hecla, Inc., 11 Calumet Avenue, Calumet 8, Mich., for booklet on heat exchangers.**

●

Fluid Cyclones Brochure. Rejection of fine sands and recovery of barites from drilling mud are among the applications given for the cyclones described in new Bulletin 830. The 16-page bulletin also features installation photos and performance data on many other applications for the cyclones. In the case history cited for a drilling rig, the cyclones increased drilling time as much

Thompson

DOUBLE VIBRATING SHALE SHAKER...and SAMPLE MACHINE



for accurate samples of cuttings

The THOMPSON SHALE SHAKER SAMPLE MACHINE offers the operator and geologist one of the best methods available for obtaining accurate foot-by-foot samples of well cuttings.

This THOMPSON DOUBLE VIBRATING SHALE SHAKER and SAMPLE MACHINE is specially engineered for off-shore barges or islands, deep wells, or wells using big volume and high pressure mud pumps. It is available either plain or galvanized, which makes it rust and deterioration-proof on off-shore or coastal duty.

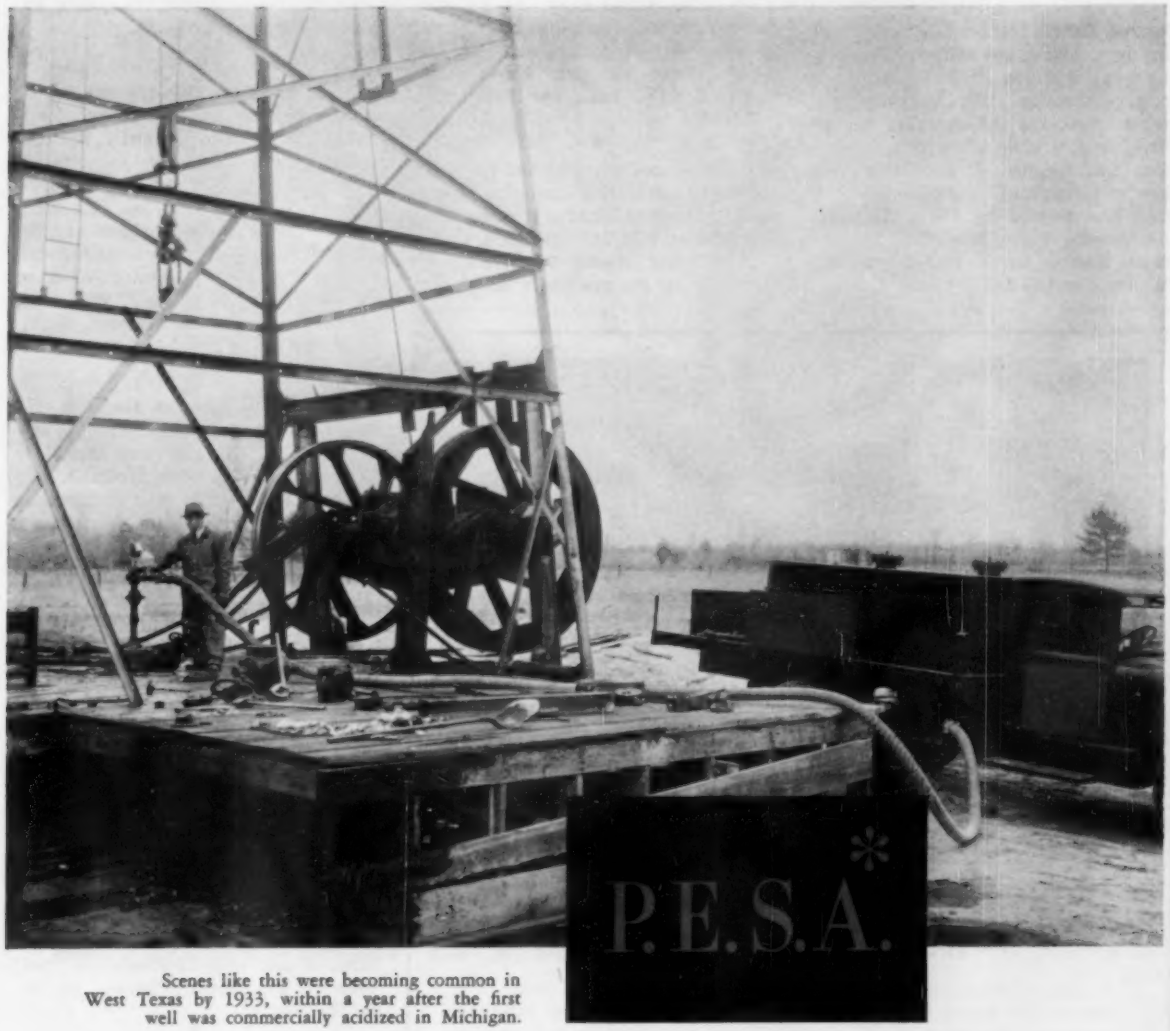
THOMPSON Shakers are famous for their highly efficient service at any depth or flow and for their economical first cost.

Make sure THOMPSON'S on the job for accurate samples and clean mud.

SOLD ONLY THROUGH SUPPLY STORES

Thompson TOOL CO.
IOWA PARK, TEXAS

Early well stimulation methods increased oil recovery



Scenes like this were becoming common in West Texas by 1933, within a year after the first well was commercially acidized in Michigan.

In 1932, production soared from 90 to 790 bopd on the second oil well ever to be treated with acid. News of this Michigan well spread so fast that within a year, acidizing was widely used in the Permian Basin.

Billions of barrels of oil, and trillions of cubic feet of gas have been recovered as a direct result of acidizing and more recent fracturing treatments. These reserves might otherwise have remained locked in the earth.

Much credit for these achievements goes to you producers who were willing to gamble your wells in an effort to increase recovery, but such successes would not have been possible if research had not developed suitable inhibitors.

We service companies, manufacturers, and supply companies that go to make up PESA are proud of the fact that we too, gambled much in helping the oil industry progress.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

57-102

PROUD TO BE PART OF A PIONEERING INDUSTRY

as 30 per cent. **Write or call: Equipment Engineers, Inc., 41 Sutter Street, San Francisco 4, Calif., for Bulletin 830.**

●

Control Valves, balanced, single seated, and tight closing, for control of numerous types of fluids are featured in new six-page Catalog 307. Cutaway diagrams show the construction of the valves and a table gives their dimensions and weights. A graph furnishes flow characteristics and equations explain how to size the valves. **Write or call: Schade Valve Mfg. Co., 2527-37 North Bodine Street, Philadelphia 33, Pa., for Catalog 307.**

Flow Meters and Controllers are pictured and described in new eight-page Publication 54-766-38. The publication explains how the meters indicate and totalize liquid flow. It discusses the construction, operation, and features of both the flow meters and the controllers. **Write or call: Hays Corp., Michigan City, Ind., for Publication 54-766-38.**

●

Unit Crane specially designed for cargo handling from a fixed mounting on offshore oil-well platforms is covered in new Folder UM-757. Devoted to the Unit Mariner Model 360 crane, the folder details the machine's design features. It then goes into an explanation of the advantages of a revolving crane over the boom-and-winch method of handling cargo. **Write or call: Unit Crane & Shovel Corp., Milwaukee 19, Wis., for Folder UM-757.**

●

Lighting Equipment is the subject of 52-page Bulletin 2697. It covers floodlights, searchlights, industrial lighting, fixture Condulets, mercury-vapor floodlights, and lighting fixtures. The bulletin gives a description of each item along with its catalog number and list price. The bulletin is punched to fit in any standard ring binder. **Write or call: Crouse-Hinds Co., Wolf and Seventh North Streets, Syracuse, N. Y., for Bulletin 2697.**

●

The Design of Preload Tanks is discussed in new eight-page Technical Bulletin T-19. Diagrams and equations furnish design data for a typical 5,000,000-gal. tank. Graphs give compression stress-strain and shear stress-strain curves. In fact, the bulletin gives engineering data and formulas of general interest to anyone considering prestressed concrete for storage tanks. **Write or call: Preload Co., Inc., 211 East Thirty-seventh Street, New York 16, N. Y., for Bulletin T-19.**

●

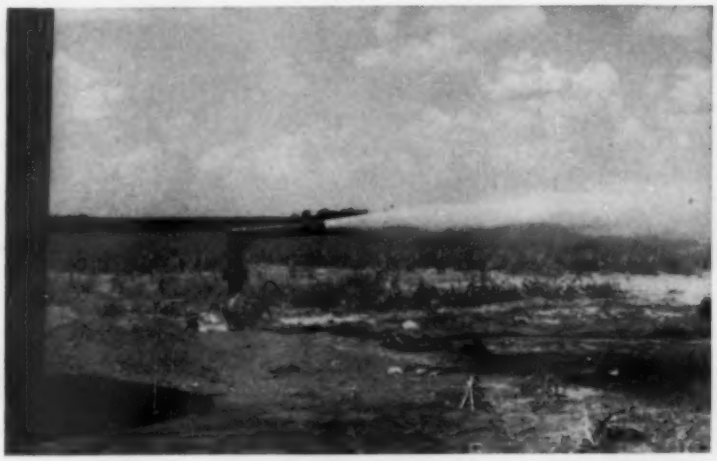
Diaphragm Pump for metering and proportioning a wide variety of fluids is the subject of new two-color, four-page Bulletin 301. This bulletin describes in detail the McCannameter diaphragh pump with speeds of 70 to 900 strokes per minute for precise ratio control. It also shows some of the possible multiple feed arrangements. **Write or call: Hills-McCanna Co., 2443 West Nelson Street, Chicago 18, Ill., for Bulletin 301.**

●

Carbon Brushes. Getting the best performance out of carbon brushes is the theme of new Booklet GEA-6688. The eight-page booklet contains question-and-answer interviews covering brush life, metal transfer, commutator threading, bar marking, and commutator adjustment. **Write or call: General Electric Co., 1 River Road, Schenectady 5, N. Y., for Booklet GEA-6688.**

●

Fabrication of Pipe and Tubing. Bulletin TDC-187, a six-page folder, describes the various methods of bending pipe and tubing and it supplies helpful hints which will overcome many of the fabricator's bending problems. **Write or call: Babcock & Wilcox, 712 Eleventh Street, Beaver Falls, Pa., for Bulletin TDC-187.**



MAGNESIUM ANODES USED TO STOP CASING CORROSION IN 100 GAS WELLS

A major company operates 100 gas wells in the Hugoton field. To protect the casing in these wells against leaks caused by external corrosion, the company called CSI engineers—pioneers in cathodic protection for oil and gas wells, pipelines, tanks, etc.

CSI engineers provided a turnkey job. They surveyed the wells, and determined that from 0.43 to 2.00 amperes of applied current per well would be necessary for protection. Surface instruments developed by CSI were used.

Then CSI designed a ground bed for each well and installed Dow's Galvomag magnesium anodes as the current source. Protection was designed to last 8 to 10 years. The cost was only about $325 per well.

Call CSI today. You'll find it pays to deal with our stockholder-employees—for expert engineering and installation services, and quality cathodic protection supplies. Estimates and quotations without obligation.

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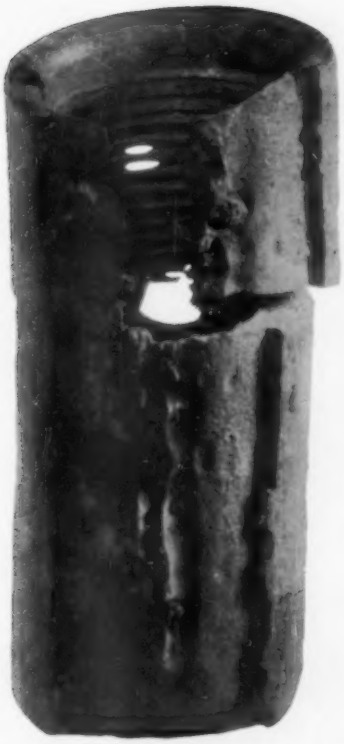
CORROSION SERVICES INCORPORATED

Tulsa, Oklahoma

P. O. Box 7343, Dept. J-20 **Telephone: Circle 5-1351**



BEFORE RODINE was adopted. Note the complete breakdown of the walls of the down-well tubing and casing.

AFTER RODINE was put to use. Though the well is highly acidic, little corrosion of the tubing and casing occurs now.

ACP Rodine® INHIBITS CORROSION IN SWEET WELLS, CONDENSATE WELLS, AND SECONDARY RECOVERY OPERATIONS—COSTS ONLY PENNIES A DAY

For just a few pennies a day you can minimize corrosion that costs you thousands of dollars annually. ACP Rodine will inhibit corrosion, cut maintenance and replacement costs, help prevent loss of production. It is readily soluble in water and brine, is effective over 200°F, can be added to the well by slugging (since it is heavier than the crude, it rapidly sinks into the water layer at the bottom of the well), or by proportioning pumps. And it does not promote or stabilize emulsion.

Specify whether your corrosion problem is in sweet wells, condensate wells, or secondary recovery operations. We'll send technical data and samples. Or our field engineering staff will cooperate with you in corrosion studies, including coupon service and fluid analysis.

AMERICAN CHEMICAL PAINT COMPANY, Ambler 39, Pa.

DETROIT, MICH. • ST. JOSEPH, MO. • NILES, CALIF. • WINDSOR, ONT.

CHEMICALS ACP PROCESSES

New Chemical Horizons for Industry and Agriculture

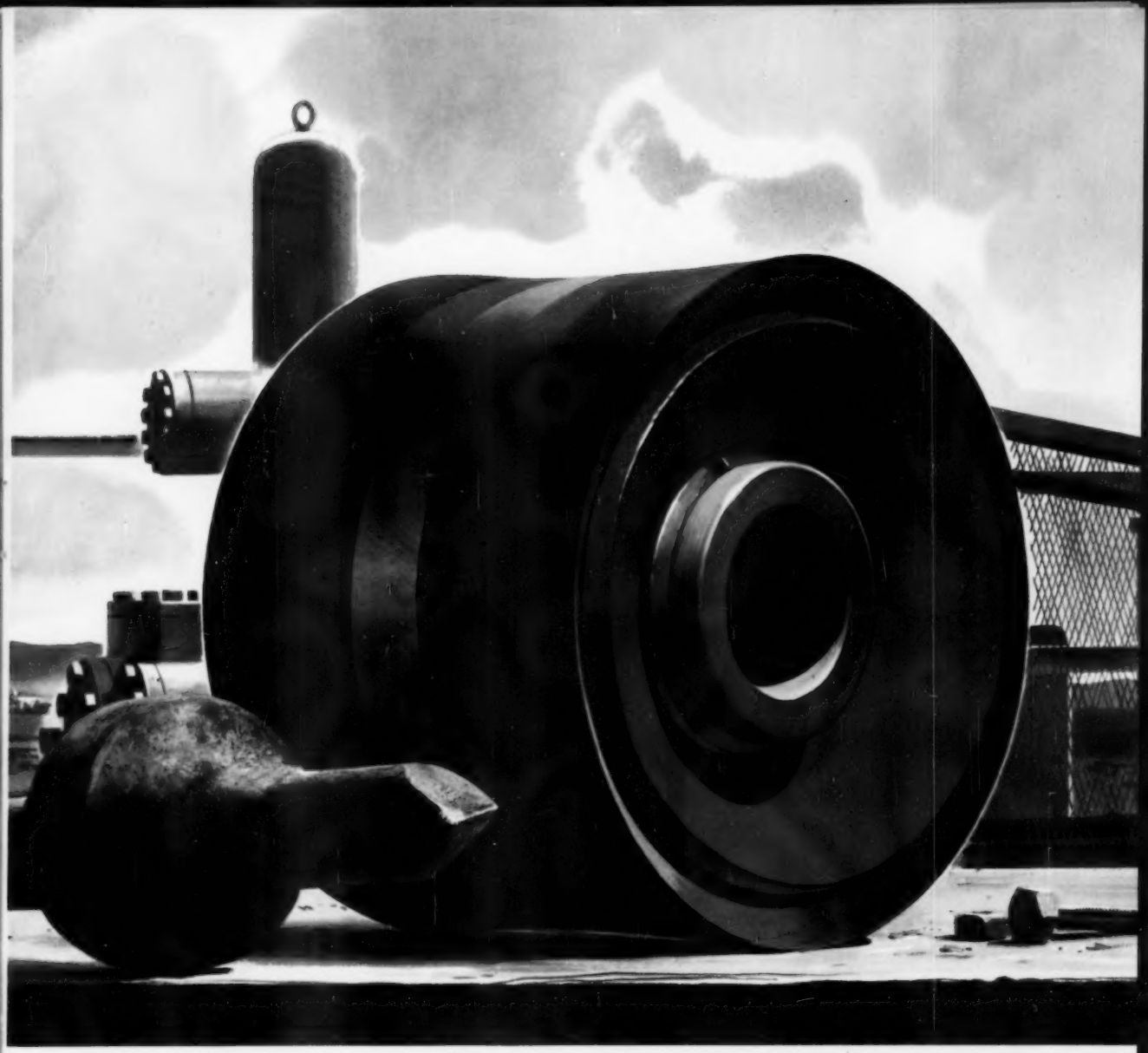
There's a lot more difference in these **MISSION PISTONS** than just ten years!

Although these two Mission Pistons look a lot alike, the 1957 model at the left will give much better service than the 1947 model at the right.

With the 1957 model, you can take advantage of far higher pump pressures than you could when using any other pistons — including Mission Pistons of ten years ago.

Or, if you don't require high pressures, you can get far longer service life than before.

Why? There are many good reasons! In the past ten years for example, *27 improvements*



have been incorporated into Mission Pistons.

Most of these improvements, such as advances in piston rubber compounds, can't be seen, but they mean that today's Mission Pistons are giving excellent service under jet drilling conditions that would have been considered impossible only ten years ago.

In addition to the changes actually made, Mission Engineers have conducted *371 test pump laboratory and field tests on piston rubbers alone in just the last three years.* That's an average of over 120 tests per year.

This kind of research means lower costs, less down time, better slush pump performance and faster drilling for you. It is an important reason why more Mission Pistons continue to be used than all other makes combined. You can get Mission Pistons and Mission Piston Rubbers through supply stores everywhere.

PESA

Nothing but the finest will bear the name of MISSION MANUFACTURING CO

MISSION MANUFACTURING CO. • P. O. Box 4209 • Houston, Texas • Cable Address—"Missco" • Export Office: 30 Rockefeller Plaza, New York
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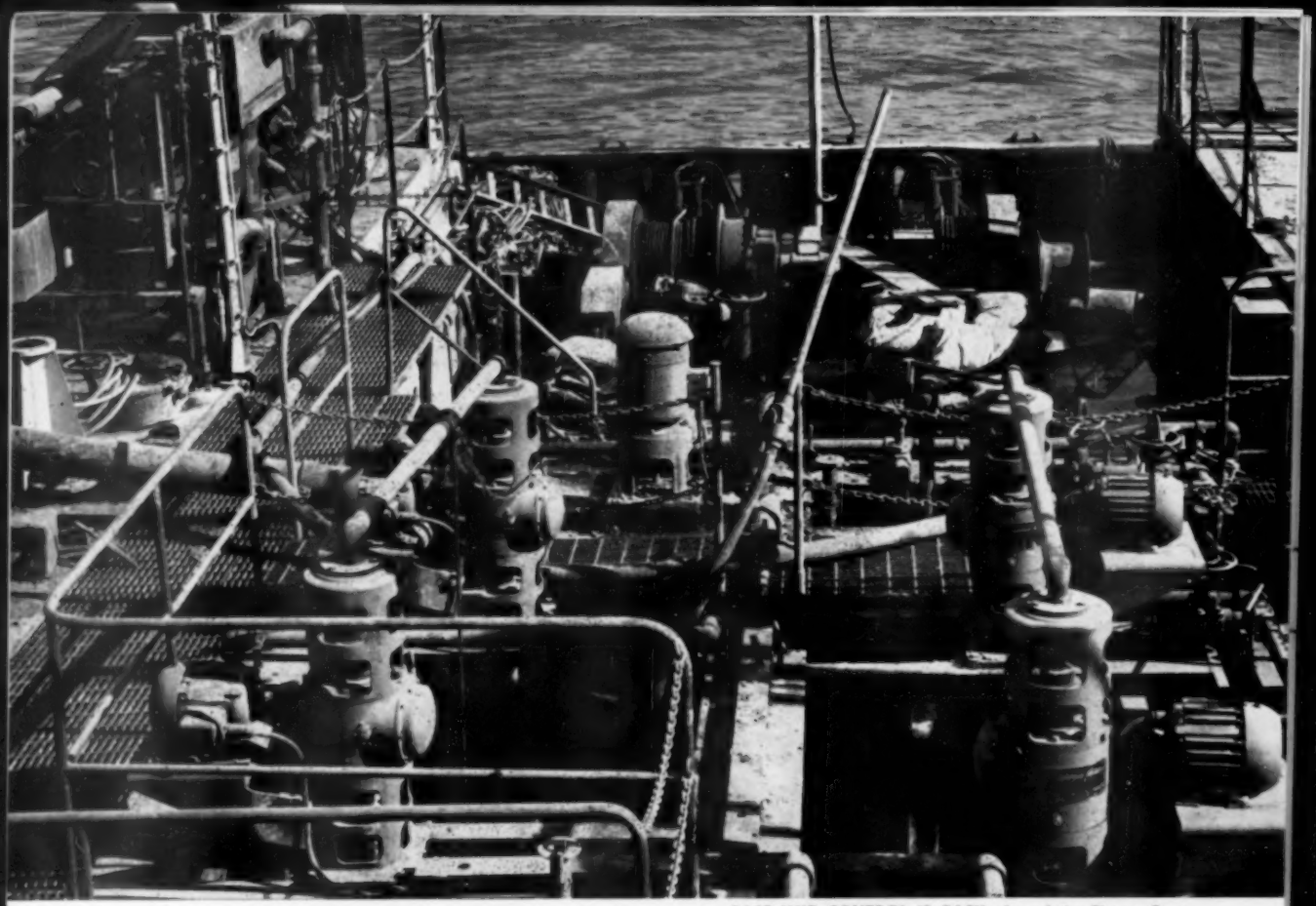
SLUSH PUMP VALVES · PISTONS · VALVE SEAT PULLERS · LINERS · PISTON RODS · VALVE SPRINGS · GLAND PACKINGS · · SLIPS · SWABS · PLUG VALVES · CENTRIFUGAL PUMPS



FAST MUD CONTROL IS EASY aboard the Rincon. Four turbine-type LIGHTNIN Mud Mixers, foreground, keep mud uniform. LIGHTNIN Flash Mixer, just left of center, incorporates weight and gel additions as fast as needed and without clogging.

Here's why mud control is no problem *on Richfield's new deep-water rig*

Hop aboard one of the first ocean-going drilling rigs—Richfield Oil Corporation's 600-ton converted LSM Rincon.

A quick glance tells you nothing has been spared to make this pioneer vessel safe, comfortable, efficient as it probes the bottom in waters up to 300 feet deep off the California coast.

Stroll over to the mud tanks and see how the Rincon's drilling crew keeps mud in top condition—ready for instant use.

Uniform mud . . . always

Above the mud tanks you see four electrically powered LIGHTNIN Mud Mixers. From each mixer hangs a shaft with a big turbine at its lower end.

These turbines churn the mud powerfully, creating strong, smooth flow and interchange throughout the tank. In constant motion, mud cannot settle out; *stays fully uniform* at the desired weight and viscosity.

Heavier mud . . . in seconds

When the driller needs heavier mud, he gets it—*in seconds.* Weight and gel additions are fed to the tanks through a LIGHTNIN Flash Mixer mounted in an open-bottom well. A high-speed propeller on this mixer instantly breaks all lumps and disperses weight and gel finely in the mud.

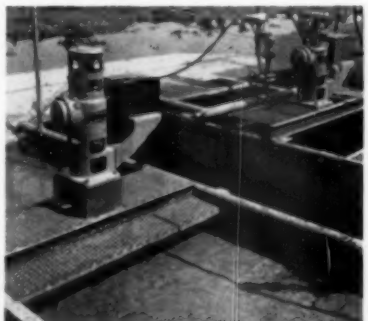
Then the big LIGHTNIN turbines swiftly mix in all additions—equalize the mud *as fast as new ingredients can be fed to it.*

Lower-cost drilling

You get faster, safer, more productive drilling with mixers like these on *your* rigs. Fewer stops; no long waits for heavier mud; *surer protection* against blowouts.

Best of all, you cut drilling cost *with* LIGHTNINS *in your mud tanks. Save the entire cost and upkeep of an extra stand-by mud pump. You need only* one *stand-by pump when you mix with* LIGHTNINS.

See for yourself what amazingly fast mud control you get with LIGHTNINS—at less than your present cost. Your LIGHTNIN Mixer representative will gladly arrange a visit to a LIGHTNIN-equipped rig near you. Call him today (he's listed in Composite Catalog). Or write us direct.



MUD REALLY MOVES. On top, underneath, all through the tank, it keeps equalizing—can't settle out. Powerful flow gives you *instant* control of mud weight and viscosity.

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MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 174-k Mt. Read Blvd., Rochester 11, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Avenue, Toronto 10, Ont.

EQUIPMENT MEN . . . in the News

Alco Products, Inc., Appoints R. G. Hilton . .

supervisor of fin tube products for the petroleum industry equipment division, according to E. N. Sieder, Houston, marketing manager for the division.

Hilton headquarters in Beaumont where Alco's petroleum industry equipment division plant is located. In addition to all types of heat exchangers for process plants, the facilities produce various types of oil-field equipment.

Hilton joined Alco in 1951 in the design and development of oil-field equipment. In 1954 he was transferred to Schenectady as an application engineer to help develop Alco's diesel electric Power Package for drilling rigs. Hilton returned to the Beaumont area as a technical service engineer for the Power Package in 1956 and moved to diesel electric sales earlier this year.

William H. Anderson Joins Crutcher-Rolfs-Cummings

He will serve as Houston sales representative, specializing in the distribution of Koehring backhoes, cranes, and Parsons ditchers for which Crutcher-Rolfs-Cummings, Inc., is the exclusive pipeline distributor.

Anderson, formerly with Anderson Equipment Co., is a veteran of 14 years in the construction equipment business.

Continental-Emsco's new facilities at Natchez, Miss. Opened recently, the modern building features several innovations.

Continental-Emsco's New Natchez Store . .

houses a complete pump shop in addition to its regular supply facilities. Much of the equipment is custom-made, and the pump shop contains a complete stock of parts for the building and repairing of subsurface pumps.

Attending the Natchez opening are A. A. Dunaway, assistant vice president, Continental-Emsco; Dean L. Fortenbery, president, Fortenbery Drilling Co.; and F. L. Brinegar, executive vice president, distribution, Continental-Emsco Co.

Raymond D. Colter is store manager at Natchez. Ike H. Metcalf, district manager, also is stationed at the store. Other store personnel include Bobby G. Winters, district D+B specialist; J. Cameron Huff and T. F. Ratcliff, both field salesmen.

The Natchez store operates under the direction of William D. Craig, division manager.

Pipe Line Technologists, Inc., Promote A. J. Le Blanc . .

to be coordinating engineer. Le Blanc joined the firm in 1952. Prior to that, he served as engineering officer for the U. S. Navy at Oak Ridge, Tenn., in connection with the Atomic Energy Program and as chief electrical engineer for Wyatt C. Hedrick Engineering Corp., Houston.

Midwestern Instruments Names R. W. Graham . .

as systems sales engineer. Prior to joining Midwestern Instruments, Inc., Graham served as manager in the data processing equipment engineering operation of General Electric Co. at Philadelphia, Pa. His experience also includes more than 8 years in supervisory engineering work and the design, development and manufacture of electronic equipment.

While with GE, Graham was responsible for designing, procuring, installing and operating a complete data processing installation for two projects of the ballistic missile program.

Graham's duties at Midwestern Instruments will be to receive and develop customers requirements on new products, system engineering of complete instrumentation complexes and new design concepts.

Corrosion Rectifying Gets Pan American Contract . .

to install a rectifier corrosion protection system on 157 oil well casings in the Elk Basin field of Wyoming.

The Pan American Petroleum Corp. contract may be the largest single project of this type ever undertaken. A single rectifier-graphite anode system will be installed for each well to protect against external corrosion attack on the casing. Total construction period will be approximately 3 months.

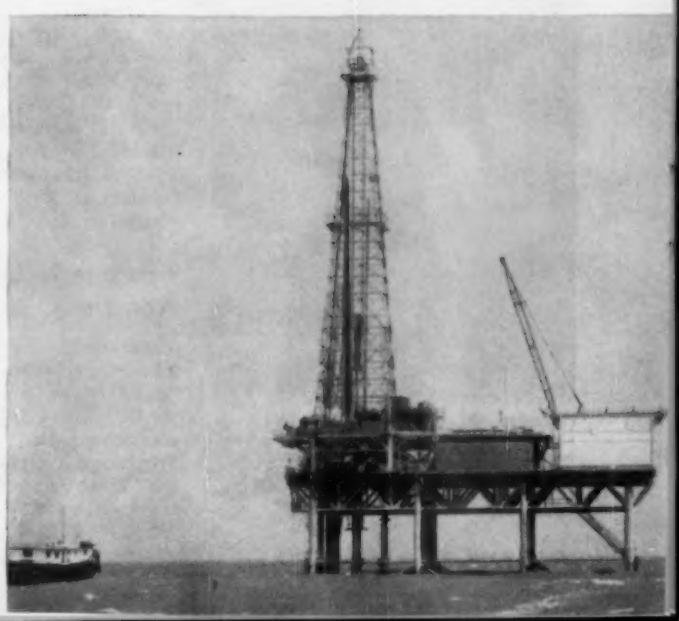
Wayne A. Johnson is president of Corrosion Rectifying Co., Inc. The project is being supervised from the main office at Houston.

Petroleum & Mining Equipment, S.A. Formed . .

to represent manufacturers of oil-field equipment. An international organization with headquarters in Geneva, Switzerland, the firm will begin operations January 1, 1958, according to A. G. Chandler, president and general manager.

Chandler has had 20 years' experience in the petroleum and mining equipment field. For the past 8 years he has been representative for the Eastern Hemisphere of two large man-

Gulf Marine's new submersible barge is powered by three Electro-Motive 900 hp generator sets. Drive motors are located on rotary, draw works and mud pumps. Barge is shown here under construction at Burton's in Port Arthur. It can drill in water depths up to 30 feet.



Permanent platform rig was put into service in March. It is presently drilling in the East Cameron area in twenty feet of water. Unit has two Electro-Motive 875 hp generator sets with drive motors on rotary, draw works and mud pumps.

NEW COMPANY LAUNCHES TWO RIGS IN ONE YEAR

Gulf Marine uses Electro-Motive Power on both—likes the advantage of "one responsibility"

Gulf Marine Drilling Company of Morgan City, La., is celebrating its second year of business with two new rigs. One, a platform, was put into service in March. The other, a submersible barge, was launched in September.

In discussing why they picked Electro-Motive Power, Gulf Marine placed top importance on these three things: number of rigs using Electro-Motive Power, parts and service facilities available and the fact that one company—Electro-Motive—was responsible for and sole manufacturer of the complete power system.

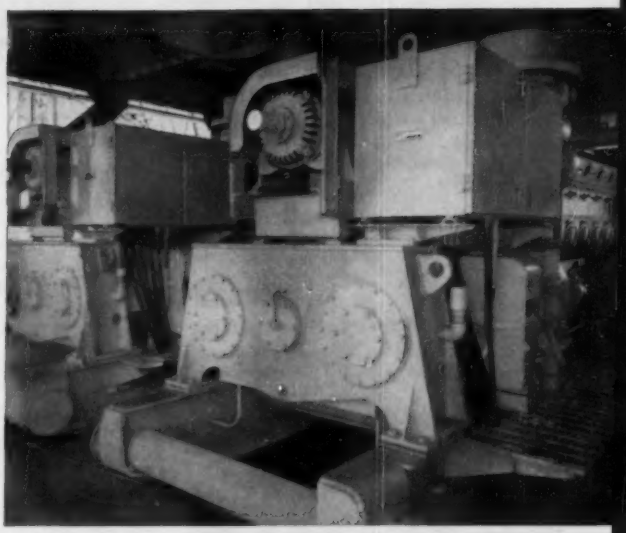
Why is this "one responsibility" important? For one thing, it is assurance that any problems concerning either the engine or electrical components will be handled quickly and satisfactorily—*from one source.*

It means, too, that engine and electrical equipment were designed and manufactured as an integral unit—matched to work better, last longer. It means dealing with only one engineer on installation for the complete power system. And it means one complete facility for all parts and service needs.

Looking at it another way, "one responsibility" is best protection against the extreme cost of downtime. To Gulf Marine with two rigs, the advantages are doubled. Why not ask your Electro-Motive representative about *all* the advantages of Electro-Motive Power?

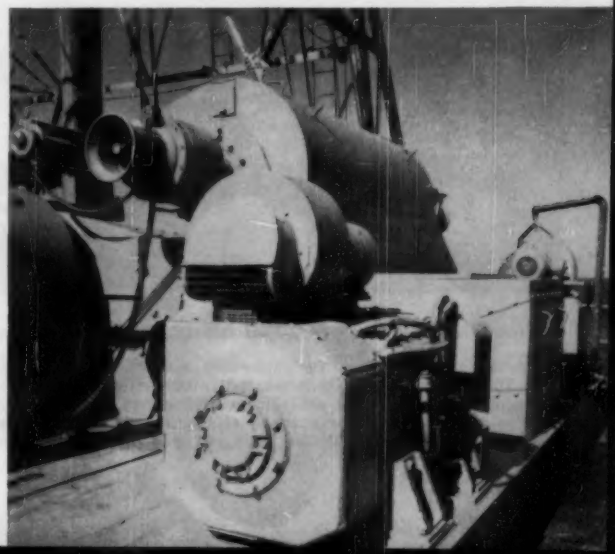
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS · La Grange, Ill.

In Canada: General Motors Diesel Limited, London, Ontario
Petroleum industry sales offices: Dallas and Houston, Texas; Morgan City, Louisiana; Los Angeles, California.



Engine sets on the platform are housed in a shed beside the mast. These two are air-cooled. Engine sets on the barge are keel-cooled.

Two drive motors of 675 hp each power the draw works on Gulf Marine's platform. Drive motors and generators on the engine sets are identical except for field windings, a factor that facilitates service and reduces cost.



ufacturers of drilling tools. He has also acted as consultant in licensing arrangements for manufacturing in Europe.

Marsteller Opens Houston Advertising Office . .

by acquisition of Rittenhouse & Co., Inc. Marsteller, Rickard, Gebhardt & Reed, Inc., has other offices in New York, Pittsburgh, and Chicago.

The Houston office will be headed by Jack D. Rittenhouse and Douglas S. Craig, who have been elected vice presidents of Marsteller - Rickard. All present personnel of Rittenhouse & Co. will continue with the Marsteller agency.

Present accounts of Rittenhouse & Co. will be serviced by the Marsteller agency. These include the Baroid Division of National Lead Co., Gray Tool, Butler Chemical Co., Southern Electric Supply Co., National Steel Products Division of National Steel Co., and the Warwick Hotel, among others.

Rittenhouse founded Rittenhouse & Co. in 1952. Widely known as a petroleum industry historian, he has published several books on the subject. Craig started in the advertising agency business in the Houston office of McCann-Erickson in 1946 and joined Gulf Publishing Co. in 1950.

Ernest Brown Appointed Chief Engineer by Weco

Previously, he was chief draftsman for Well Equipment Manufacturing Corp., according to J. H. Robinson, vice president and general manager.

Brown has been with Weco since 1940. During his first 8 years with the company, he held supervisory capacities in different phases of manufacturing and production in the Weco plant. For the past 9 years he has been a member of the engineering department, during which time he worked on many of the improvements incorporated in Weco unions.

Lee C. Moore Plant Is Opened for Inspection . .

as 14 senior engineering students from National University of Mexico, Mexico City, tour United States oil-industry installations. Moore personnel and senior students in the picture are: (front row) R. D. Woods, Lee C. Moore; Manuel Villamar V.; Rogelio Madrigal Perez; Juan Jose Rocha Rangel; Victor Martinez Martel; Alonso Ruis Becerril; Gabriel Hernandez Bravo; J. W. Born, Lee C. Moore.

Back row: H. J. Woolslayer, Lee C. Moore; H. L. Clawson, Lee C. Moore; Evis Cabrera Munos; Cruz Rosas Nunez; Anastasio Aguilar Silva; Higinio Rivas Gomez; Alfonso Betancourt M.; Jose Justo Macias A.; Rene de Leon Botello; Juan Jose Vilchis V.; Cecil Jenkins, Lee C. Moore; C. D. Iddings, Lee C. Moore.

Perkin-Elmer Forms Third European Subsidiary . .

by the organization of Perkin-Elmer, Ltd., a manufacturing and research development subsidiary in England, according to Richard S. Perkin, president of Perkin-Elmer Corp.

The new company has purchased a factory in Beaconsfield, near London, and has opened a sales office in London to be managed by P-E's European sales subsidiary, Perkin-Elmer A.G. Initially, the English subsidiary will be licensed to produce P-E's new Infracord spectrophotometer, a low-cost infrared instrument.

A. R. Gilson is managing director of Perkin-Elmer, Ltd. In addition, a panel of British scientists will serve as an advisory committee for the new subsidiary.

Oil Well Supply Division Names Chenault, Gerke . .

J. E. CHENAULT

assistant district manager at Edmonton, Alta., and field representative at Drayton Valley, Alta., respectively, according to W. A. Weir, Canadian area manager of this U. S. Steel division.

James E. Chenault, Jr., who joined Oilwell in 1948 at the Dallas, Tex., headquarters office, has served as auditor, assistant inventory analyst at Dallas, and coordinator-price regulations. Prior to his present appointment he was pricing coordinator.

Harold R. Gerke, who was employed in 1953 at Edmonton, has served at Wetaskiwin, Edmonton and Valleyview.

Failing Establishes Mobile Store at Shiprock . .

to stock most-needed items for exploration and drilling rigs working in the Four Corners area. The large trailer has been provided with shelving and bins to accommodate the parts and supplies which will be available to drilling crews in the area. The smaller trailer will serve as an office and living quarters for George E. Failing Co. personnel.

Don Toben, a former drilling contractor, will be the store manager at Shiprock, N. M.

Industrial Equipment Co., Mud Fibre Sales Expand . .

representation for their products in the oil drilling field, according to Marvin L. Fergestad, president of both companies.

Fred McFarland, McFarland Associates, will represent Industrial Equipment Co. and Mud Fibre Sales throughout the Casper area. In the Bighorn basin area, the firms will be represented by Dick Lynch & Associates.

Among the manufacturers represented by Industrial Equipment Co. are Aeroquip Corp., Columbus McKinnon Chain, Engine Life Filters, B. F. Goodrich Co., Lebus Manufacturing Co., Ewing Manufacturing Co. Weatherhead Co. and Wyeth-Scott Manufacturing Co.

Allis-Chalmers Appoints William A. Schubert . .

engineer in charge of rotary compressor sales. Schubert has been with Allis-Chalmers Manufacturing Co. since 1937 and in recent years had been an application engineer in the firm's compressor department.

Catalysts & Chemicals, Inc., Is Organized . .

to manufacture specialty catalysts for the chemical and petroleum industries. Principals of the new Louisville, Ky., company are Dr. R. E. Reitmeier, Louisville, Dr. J. L. Parker of Tulsa, and a group of technical associates including Earl Englert, catalyst sales; John S. Cromeans, technical service; Dr. Harold W. Fleming, research and development; Dr. Kenton Atwood, staff technical consultant; and Paul E. Huber, catalyst manufacture.

The main offices, research laboratories and manufacturing facilities will be located in Louisville, where the firm has purchased a block of manufacturing buildings formerly occupied by Mengel Co.

Reitmeier was formerly manager of the catalyst division of Girdler Co. and has been active for a number of years in the field of industrial catalysis.

Franks Produces First Unit Since Move to Pampa . .

from the division's original location in Tulsa, according to R. A. Baker, vice president and general manager of Franks Division, Cabot Shops, Inc. This well servicing unit is a Cruiser Model, 658-TM single-drum pulling machine sold to Servicios Pozos Anzoategui Co., Anaco, Venezuela, of which J. M. Williamson is owner and operator. The purchaser is a contractor doing well servicing work for several major oil companies in Venezuela.

The unit is designed for both rod and tubing pulling 6,500 to 12,000-ft. depths of 2½-in. tubing with a standard 10-in. by 13-in. telescoping pipe mast.

J&L Supply Has Opened This New Store . .

in Farmington, N. M., to serve the Four Corners fields. According to Rainey Elliott, of Jones & Laughlin Supply Division, the 7,560-sq.-ft. facility will house a subsurface pump shop and warehouse.

The Farmington store will be in J&L's South Rocky Mountain district and under the over-all supervision of D. H. Carson, district sales manager, headquartered at Denver, Colo. T. P. Dellone, formerly manager of the firm's Sherman, Tex., store, has been appointed local store manager of the new store and assisting him will be storemen W. C. Bruegger, M. J. Evans and W. R. Morrow. D. R. Duncan and J. R. Robinson have been assigned to the new store as sales representatives.

W. B. Duncan Joins Oil Country Equipment . .

in an executive sales capacity, according to M. F. Wright, president. Duncan was with Houston Oil Co. of Texas more than 35 years. At the time of the purchase of Houston Oil by Atlantic Refining Co., he was manager of drilling and production.

Duncan will headquarter at the Houston offices of Oil Country Equipment Co., Inc. This firm manufactures and distributes Pathfinder centralizers and hole bore wipers.

Fiftieth Anniversary Noted By Westcott & Greis . .

a division of American Meter Co. Westcott & Greis was founded in 1907 by H. P. Westcott and H. N. Greis to develop and sell measurement and control equipment for gas and petroleum products in the Southwest. Much of the basic measurement reference material on gas and petroleum now used by the industry was developed by Westcott & Greis.

James H. Satterwhite, president, has been with the division 40 years. He has had an active part in the original development and introduction of many measurement and control products.

Since 1932 Westcott & Greis has been a wholly owned subsidiary of American Meter. It now operates through two main sales divisions. The northern division is headquartered in Tulsa under Cade C. Clover, and the southern division is directed by Howard W. Wahl with headquarters in Garland, Tex.

ERSKINE ROACH

IVAN BAKER

Harold Brown Co. Promotes Erskine Roach, Ivan Baker

Roach is vice president, engineering, and Baker, vice president in charge of manufacture, according to Harold Brown, president.

Roach joined the company in April 1956, after being with Stanolind Oil & Gas Co. 8½ years in Tulsa and Houston. Baker came to Harold Brown Co. in January 1956. Prior to that he was with Garrett Oil Tools 5 years and was superintendent of manufacturing in Longview.

L. G. Maechtlen Named Square D First Vice Pres.

A director and vice president of Square D Co. since 1951, Maechtlen has for the past 3 years served as manager of the company's western division which has a headquarters plant in Los Angeles. As first vice president he will report directly to Gordon Patterson, president, and will work from the Detroit executive offices.

Maechtlen joined Square D as a draftsman in 1926, successively becoming chief engineer, works manager, dis-

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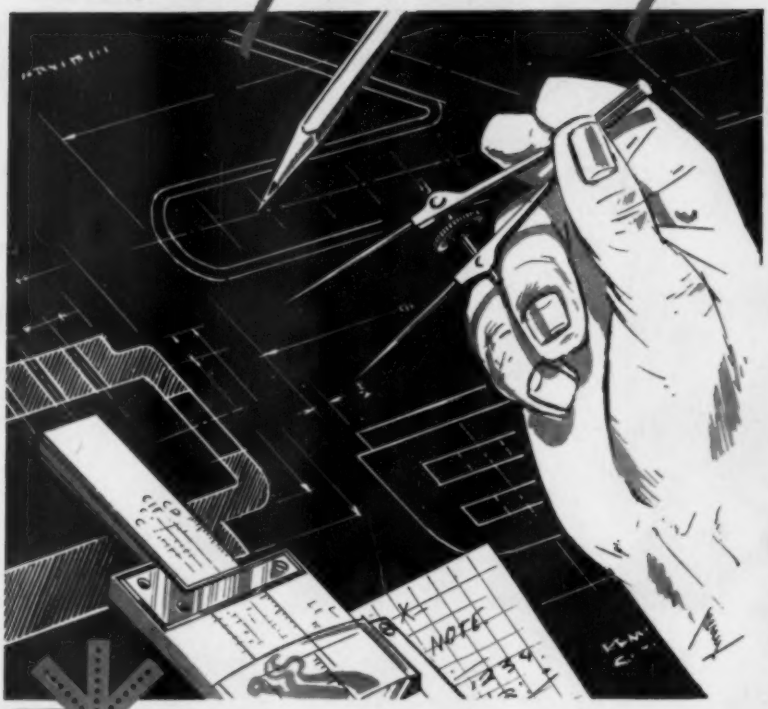

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JOHN ZINK COMPANY

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trict manager, sales manager and manager of the western division. The division, one of Square D's four principal U. S. manufacturing units, has assembly plants in Denver, San Francisco and Seattle in addition to the main Los Angeles facility.

Lacy Oil Tool Co. Makes W. R. Wiley Sales Mgr. . .

W. R. WILEY

with headquarters in Los Angeles, according to Roger Bramble, general manager of the company. Wiley was previously with McCullough Tool Co. He has been connected with the oil industry since 1934, beginning with Emsco Derrick & Equipment Co. and Columbia Stamping & Manufacturing Co.

M. C. Bolin Appointed McNamar Vice President . .

M. C. BOLIN

of the gas compressor and gas products division of the firm, according to James Jackson, president.

Bolin joined McNamar Boiler & Tank Co. in 1946 as a salesman, was made sales manager and in 1953 was appointed manager of the gas compressor division, the position he held prior to his recent appointment.

Sales, Manufacturer's Agents Named by Win-Well

Charles A. Little of Houston and Beal Equipment Co. of Odessa, Tex., have been appointed sales representatives, according to William Pollock, president. George K. Sutton Co. of Crowley, La., has been named manufacturer's representative covering the southern Louisiana, Gulf Coast, Mississippi and Alabama area.

Little for the past 14 years has served as Texas Gulf Coast district manager of Sargent Engineering Co., prior to which he spent 12 years with Atlas Supply Co. and 3 years with American Chain & Cable.

Walter Beal and I. V. Boren are the two principals in the Beal Equipment firm. Before starting his own business, Beal had been with National Supply Co., Rowan Drilling Co., Camco, Inc., and Daniel Orifice Fittings.

Sutton previously worked in the pro-

duction departments of Carter Oil Co. and Amerada Petroleum Corp. and for A. W. Eggleston Drilling Co. of Crowley as well as Gulf Drilling & Well Service Co. of Lake Charles, La. He formed his own manufacturer's representative company 6 years ago.

Felton D. Henry Joins Petroleum Tool Co., Inc.

Named as sales manager, Henry was with Security Engineering 6 years and American Iron 1 year prior to his appointment by Petroleum Tool.

Youngstown's Pipe Mill Begins Operation . .

at the Indiana Harbor Works, East Chicago, Ind., according to Harold Hoekelman, Chicago district manager. Until now, all seamless facilities of Youngstown Sheet & Tube Co. were located in the Youngstown, Ohio, district. Products ranging in size from 4½ to 9⅝ in. o.d. will be made.

Newly Formed Whelan Corp. Opens Tulsa Offices . .

to offer a heatless oil treater in six states. Dan E. Whelan, Jr. is president of the new firm.

While working as an oil operator in eastern Texas, Whelan learned about the heatless oil treater and organized the new corporation to make it available in the Midwest area.

Oilfield Sales & Service Expands Facilities . .

of its western division in Maracaibo, Venezuela. To accommodate the increased activity on the eastern side of Lake Maracaibo, a new warehouse has just been completed in Tia Juana. The operations of the western division are under the direction of Jerome C. Kearby.

The eastern division of Oilfield Sales & Service, S.A. is managed by Paul C. Koester with its office and warehouse located in Anaco. Both divisions represent Garrett Oil Tools, Texas Iron Works, Byron Jackson, Christensen Diamond Products, S. R. Bowen Co. and Emsco Screen Pipe Co. in Venezuela.

L. F. Drake Named by Welex Jet Services . .

L. F. DRAKE

as manager of the Oklahoma division, according to J. B. Vaughan, vice president of sales of the Fort Worth oil-well service company. Drake will headquarter in the company's division office in Tulsa. Drake has served the past year as assistant sales manager of the company. Prior to that he was Fort Worth city sales engineer. In 1955 he was transferred to Fort Worth from Tulsa where he had been Oklahoma division sales engineer and had worked as sales engineer and assistant manager in the Ardmore district.

Reilly Tar Promotes Nick V. Kostoff . .

to technical services representative, according to E. E. Goodman, district sales manager. In this position, Kostoff will handle the chemical and petroleum technical service in the southwestern district.

For the past 6 years, Kostoff has served as plant chemist at Reilly Tar & Chemical Corp.'s Granite City, Ill., plant.

National Supply Forms Ohio District . .

by consolidation of its Kentucky-West Virginia district and its Michigan-Ohio-Pennsylvania district. Known as the Ohio district, the new district is headquartered at Wooster, Ohio. Edward L. Wightman, formerly store manager of the Butler, Pa., store, is district manager. John C. Jett, formerly district manager of the Kentucky-West Virginia district, has been transferred to National Supply Co.'s general headquarters at Pittsburgh, where he will be in charge of the eastern division sales office.

Assistant district managers are Robbert A. Orndoff, with headquarters at Mount Pleasant, Mich., and David E. Bayer, with headquarters at Charleston, W. Va.

Orndoff will be responsible for the company's oil field and water well supply stores at Mount Pleasant, Reed City and West Branch, Mich., and Bayer for stores at Paintsville, Ky.; Waynesburg, Pa.; and Charleston and Weston, W. Va. Other stores in the consolidated district are at Logan, Wooster and Zanesville, Ohio; and Bradford, Butler and Titusville, Pa.

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Williston Flirts With the Jackpot

By Frank J. Gardner
Exploration Editor

A HUGE challenging oil bowl has suddenly spewed forth a crop of new oil fields that may well place it ahead of the Paradox basin in industry favor during 1958. On January 7 of this year, this column cautioned that ". . . at this crucial time in Williston history, when vast acreage holdings are coming up for renewal, the basin must prove its worth or suffer the consequences of exploration rigor mortis." The far-flung successes pictured on the map are ample proof the challenge has been met, and that this largest of American basins harbors a lot more oil than most operators have dared to think. And the threat of exploration rigor mortis has evaporated in a cloud of optimism.

With an accent on depth . . . The slow and steady growth of the Nesson anticline oil queue in northwestern North Dakota has added some important new reserves in 1957. Here, the accent is on depth, as Amerada Petroleum Corp. has probed to the basement in a cluster of ultradeep wildcats. The deepest of these, the 9-A Unit (16-156n-95w), set a new depth record for the state when it quit at 14,828 ft. Another, the 1 Iverson - Nelson Unit (2-155n-96w), made oil history and evoked such terms as "fabulous" and "fantastic" from usually conservative oil men; it discovered at least eight potential pay horizons below Mississippian level, and gave thunderous warning to Williston operators that they have yet to tap the real potential here. Meanwhile, new fields were found at the north and south ends of the anticline, as well as in its middle.

And the death of a myth . . . But the truly significant signposts to Williston's future lie **off** the Nesson anticline, and they point in **every** direction. The 1957 discoveries have emphasized the basin's multiple pay prospects and destroyed the myth of "concentrated accumulation." The most important of these occurred in January, when Amerada opened Outlook field with a 2,742-bbl. Silurian strike in northeastern Montana, and Northern Pump Co. finished its Rocky Ridge discovery in the Heath-Mississippian for 1,224 bbl. in southwestern North Dakota.

WILLISTON BASIN, with 22 new discoveries on tab for 1957, and several new pay horizons before it, is well on its way to a new era of active exploration.

Since that time, the Outlook area has paid off with good wells not only in the Silurian, but in the Devonian and Red River - Ordovician. In the Rocky Ridge region, meanwhile. Northern Pump has scored with a Rocky Ridge offset, and two new fields have been discovered: Amerada 1 Scoria Unit (10-139n-101w, Billings County), has reported flowing oil from both the Heath and Madison - Mississippian ("Fryburg pay") formations; and in Stark County near the town of Dickinson (32-140n-96w), Leach Oil Co. recently completed its 1 Kalanek as a Madison-"Nesson" discovery for 140 bbl. per day.

To the south, Shell Oil Co. gave South Dakota its second Williston oil field in July, at 32-17 Graves (17-21n-4e. Harding County); this was a Red River strike pumping 144 bbl. daily from 8,600 ft.

Far to the north, the "border county fields" are in the midst of a discovery spree that promises to rival southeastern Saskatchewan's 1956-57 binge. New fields have been found at Wayne and South Westhope (both in Bottineau County), at Southwest Aurelia (Ward County), Entry and Lignite (Burke County), and at Ecklund (Divide County). Discoveries are now in the testing stage at Petroleum Corp. of America-Tom Jordan 1 Jorgens and at the same operators' 1 Nygaard; both are in Burke County—one is opening Midale pay (Jorgens) and the other is in Nesson pay (Nygaard).

Of all these northern fields, one is a real standout, and it leads North Dakotans to believe that at last they've enticed some of Saskatchewan's magic to the south side of the forty-ninth parallel. This is Lignite. Here is a Midale-Mississippian field yielding 200-bbl. wells from the 6,000-ft. level; five producers have been finished in rapid succession, and more are on the way.

A giant may arise . . . So Williston, after 6 years of ups, downs, ifs, and maybes, seems at long last to be on its way to really big success. With 22 discoveries on record already, 1957 promises to be the best year in its history, and if Rocky Mountain operators ever get around to drilling the basin's far east side, the industry may finally come to grips with a real oil giant.

THE JOURNAL'S EXPLORATION SUMMARY FOR SEPTEMBER
Iosegun Is Newest Slave Point Discovery
Success Recorded On Rocky Mountain Front In Alberta
Trenton Well Stirs Up New Scipio Interest In Michigan
East Chesterville is Illinois' Discovery of Year
Palo Duro Basin Adds Second and Third Discovery
Krieger is Oklahoma's Deepest Producing Well
Rank Smackover Discovery in Union Parish
First Significant Strike in East in 40 Years at Conneaut
First Mississippian Oil Found In British Columbia

Michigan, Illinois, Louisiana, Oklahoma, and Texas make the news and . . .

Canada and Ohio share honors while . . .

September Drilling Taps New Reserves

By John C. McCaslin
District Editor

SEPTEMBER exploratory success on the North American Continent was centered in western Canada, Ohio, Michigan, Illinois, Louisiana, Oklahoma, and in the Texas Panhandle. The month's biggest news-getters were British Columbia and Ohio. A major Mississippian oil find in Canada's westernmost province and the first big exploratory news in the Appalachian province in nearly 40 years topped the month's activity.

First Mississippian oil . . . The Blueberry River region, 55 miles northwest of Fort St. John, apparently scored the most significant oil strike in British Columbia to date. Two Mississippian oil discoveries were made during September, opening a new oil pay for this Pacific Coast province of Canada, and possibly tapping the biggest oil reserve yet found in the region.

According to Fargo Oils, Ltd., who has a substantial interest in the Blueberry River development along with White-Lloyd & Associates, and Gulf States Oil Co., the No. 11 and No. 16 Blueberry River wildcat discoveries are the most important oil finds in British Columbia to date—the newest province in Canada to find oil.

Blueberry River is the most northerly proved oil-producing area in British Columbia and it promises to be a reserve of major proportions. Only further drilling operations will determine the full worth of these new discoveries. During production tests the No. 16 well flowed at the rate of 800 bbl. of oil per day. The No. 11 well flowed 569 bbl. per day. There was also considerable gas in the Nikinassin and Triassic formations.

A rank Ohio strike . . . Benedum-Trees et al unveiled what is possibly the most significant oil strike in the East in nearly 40 years at a wildcat 10 miles south of the town of Conneaut in extreme northeastern Ohio's Ashtabula County.

The 1 Scribner, 6 miles west of the Pennsylvania line and 50 miles from any oil production of note, flowed 700 bbl. to tanks before being shut in due to lack of storage space. Production is from 48 ft. of Medina-Silurian sand, a pay thickness of near record proportions for the East. This Ohio strike is especially interesting at this point due to the new interest of Great Lakes states in the possibilities of oil and gas under Lake Erie. The discovery also points up the fact that there remain many hidden oil secrets in this oldest of producing provinces.

More Slave Point oil . . . First Virginia Hills, Swan Hills, Kaybob, Edith Lake, and now Iosegun. These new oil areas of Alberta, stretching 35 miles

Total September Completions, Exploration and Development

	Total completions							Wildcat wells								Act.
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	D.D.	op.
Alabama	3	3	0	0	0	0	26,981	0	0	0	0	0	533	2	1	9
Arizona	1	0	0	0	1	0	2,200	1	0	0	0	1	2,200	0	0	1
Arkansas	107	71	0	2	34	0	327,125	18	2	0	1	15	67,068	0	0	75
California	191	144	0	3	44	0	891,497	38	5	0	1	32	232,626	0	0	216
Colorado	68	21	0	5	42	0	366,128	36	3	0	0	33	202,717	0	0	140
Idaho	2	0	0	0	2	0	5,900	2	0	0	0	2	5,900	0	0	...
Illinois	234	119	0	1	114	0	547,384	44	5	0	0	39	90,741	39	2	431
Indiana	55	16	0	0	39	0	98,881	9	0	0	0	9	13,312	14	0	102
Kansas	312	149	0	17	137	9	1,116,510	65	9	0	1	55	266,616	16	0	440
Kentucky	134	39	0	15	80	0	175,331	34	2	0	0	32	33,600	21	0	194
Louisiana	338	146	18	28	145	1	2,619,714	61	4	1	6	50	590,433	0	1	556
North	126	68	0	10	48	0	431,192	16	2	0	1	13	86,983	0	0	197
South	161	56	18	10	76	1	1,687,381	39	2	1	1	35	435,980	0	1	276
Offshore	51	22	0	8	21	0	501,141	6	0	0	4	2	67,470	0	0	83
Michigan	49	21	0	7	21	0	142,267	11	2	0	0	9	31,273	22	0	123
Mississippi	41	12	4	0	25	0	300,225	18	2	0	0	16	125,106	0	0	51
Montana	36	8	0	4	24	0	175,928	23	0	0	1	22	113,186	5	0	66
Nebraska	65	21	0	0	44	0	390,060	37	5	0	0	32	220,364	0	0	62
Nevada	3	0	0	0	3	0	5,985	3	0	0	0	3	5,985	0	0	2
New Mexico	178	91	3	51	33	0	919,700	18	1	0	0	17	86,232	0	0	222
Northwest	78	19	2	48	9	0	368,261	6	1	0	0	5	25,298	0	0	154
Southeast	100	72	1	3	24	0	551,439	12	0	0	0	12	60,934	0	0	68
New York	37	17	0	0	2	18	44,342	2	0	0	0	2	9,342	37	0	21
North Dakota	23	11	0	0	12	0	138,980	15	3	0	0	12	76,292	0	0	54
Ohio	86	41	0	17	22	6	199,397	1	0	0	0	1	3,494	85	0	149
Oklahoma	506	286	7	19	160	34	1,805,601	72	13	2	4	53	332,278	94	11	878
Pennsylvania	44	13	0	16	5	10	156,593	0	0	0	0	0	0	40	1	91
South Dakota	7	0	0	0	7	0	24,804	7	0	0	0	7	24,804	0	0	2
Tennessee	28	0	0	3	25	0	47,572	28	0	0	3	25	47,572	28	0	4
Texas	1,729	1,005	44	73	587	20	7,147,125	349	33	6	4	306	1,572,532	81	0	1,155
Dist. 1	100	44	4	14	38	0	271,925	26	0	1	0	25	67,917	1	0	37
Dist. 2	60	17	2	16	25	0	345,052	12	4	1	0	7	70,489	0	0	44
Dist. 3	122	47	14	3	57	1	809,629	28	0	1	1	26	207,914	0	0	103
Dist. 4	122	49	7	6	59	1	641,553	36	3	2	0	31	217,312	0	0	71
East	129	78	9	0	40	2	593,188	34	2	0	0	32	167,095	0	0	59
Dist. 7-B	263	128	0	3	131	1	759,997	69	12	0	0	57	222,673	34	0	84
West	473	369	4	3	86	11	2,236,548	61	4	0	1	56	296,604	29	0	528
Dist. 9	350	198	0	12	136	4	1,009,102	74	7	0	2	65	258,620	17	0	115
Dist. 10	110	75	4	16	15	0	480,158	9	1	1	0	7	63,908	0	0	114
Utah	24	10	0	2	12	0	113,692	8	0	0	0	8	33,058	0	0	105
W. Virginia	76	17	0	47	12	0	207,296	3	0	0	1	2	17,799	74	0	255
Wyoming	54	16	0	3	30	5	281,695	20	4	0	0	16	116,812	6	1	168
Sept. 1957	4,431	2,277	76	313	1,662	103	18,278,913	923	93	9	22	799	4,321,875	564	17	5,572
Aug. 1957	5,506	2,748	75	367	2,222	94	21,842,426	1,162	98	4	20	1,040	5,328,486	868	61	5,513
Cum. 1957	39,997	20,730	416	2,870	15,151	830	165,532,703	8,880	919	74	306	7,581	41,668,276	5,883	362	....
Cum. 1956	43,870	23,442	353	3,023	16,309	743	177,087,000	9,719	1,242	....	320	8,157	46,465,000	....	....	....

Note: C.T.—Cable tool comp.; D.D.—O.W.D.D.; Act. op.—Active operations.

Western Canada

	All wells					Cum.	Wildcat wells					Cum.
	Total	Oil	Gas	Dry	Footage	1957	Total	Oil	Gas	Dry	Footage	1957
Alberta	143	89	12	42	662,730	1,093	30	11	2	17	145,416	295
Saskatchewan	115	74	3	38	494,854	933	32	5	2	25	127,510	227
Manitoba	12	6	0	6	28,514	186	6	0	0	6	15,272	55
British Columbia	8	2	4	2	54,176	68	8	2	4	2	54,176	45
Northwest Territories	....	....	....	....	.....	3	....	....	....	....	.....	3
Total	278	171	19	*88	1,240,274	2,283	76	18	8	50	342,374	625

*Incl. 5 service wells: Alta. 1, Sask. 4.

from Swan Hills to Kaybob, have been the center of oil news in Canada this year. The newest addition is Iosegun, a California Standard Co. et al Slave Point-Middle Devonian discovery 5 miles south of Kaybob. An oil flow of 130 bbl. per hour was measured during tests of the Slave Point which until last winter was not productive in western Canada. Five wells drilled within 8 months by three separate operators found oil in this zone.

This Slave Point play in Alberta is divided into two sections—Swan Hills, Edith Lake, and Virginia Hills on the east, and Kaybob and Iosegun on the west. All of the wells have been prolific producers. Reserves of the two areas are anybody's guess. There is much left for the drill as there has been no drilling between the two areas.

A new Rocky front . . . Gas exploration up and down the Rocky Mountain front in western Canada suddenly fired up in September with four discoveries recorded.

The Central Foothills Agreement group found gas at Lambert Creek, Mountain Park, Lovett River, and Stolberg. The Lambert Creek well is the northernmost of the new gas finds and unlike the others which found gas in the Mississippian is a Devonian D1 success. Lambert Creek is 30 miles northwest of Lovett River, 19 miles north of Mountain Park, and 70 miles northwest of Stolberg.

A new producing record . . . Oklahoma has a new record producing depth at a Knox field deep wildcat discovery in Stephens County.

British-American Oil Producing Co. 1 Krieger flowed 6,200 M.c.f. of gas

Breakdown of Field Wells Drilled in September 1957, by Depth

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama			1				2																				
Arkansas	1	47	12	6	2	1						1							1	3	8	6		1			
California	26	32	23	12	13	15	11	7						2					3	1	2	1	2	1	2		
Colorado		1		10	5	2						1		4							3	4	2				
Illinois	10	47	45	12						1									12	18	43	2					
Indiana	1	12	3																7	19	4						
Kansas		26	86	27	1						1	8	7						1	5	49	27	9				
Kentucky	20	16	1							2	4	8	1						28	15	5						
Louisiana	3	40	11	8	21	24	26	21	5		6	1		6	1	4	3	1	2	8	18	3	16	20	20	8	1
North	2	39	10	5	9	1					6			2	1				2	8	17	3	3	1	1		
South	1	1	1	3	7	14	19	20	5			1		2		3	3				1		8	13	14	5	1
Offshore					5	9	7	1						2		1		1					5	6	5	3	
Michigan		3	10	6							7									1	10	1					
Mississippi				1	4	7	2															1	6	2			
Montana			3		1	4				1		2							1		1						
Nebraska					16																		12				
New Mexico	2	10	14	25	20	6	16				7	5	6	31	2				1	4	4	3		1	3		
Northwest	1	2		1	16						6	4	5	31	2					2	1	1					
Southeast	1	8	14	24	4	6	16				1	1	1						1	2	3	2		1	3		
New York	17																		18								
North Dakota				1	1	6																					
Ohio	10	1	30							1	5	9	2						12	9	6						
Oklahoma	31	75	78	39	37	16	2				1	3	4	6	1				22	34	43	16	23	3			
Pennsylvania	5	8								1	1	3		11						7	6		2				
Texas	83	212	273	136	195	77	27	5		1	9	23	8	21	6	1			41	94	36	54	53	20	3		
Dist. 1	11	17	11	1	5	2				1		12				1			5	5		2			1		
Dist. 2	1			1	7	5						4	5	4	3						3	6	7	1	1		
Dist. 3	2	3	7	7	12	19	9	1					1	1					3	4	4	1	11	9			
Dist. 4		2	18	5	19	3	4				2	2	1	1					1	5	6	5	8	4			
East	14	14	10	5	34	7	1														2	2	5	1			
Dist. 7-B	10	54	14	29	9						1	1	1						13	29	9	19	5				
West	5	36	136	62	78	36	12	4						2					3	17	3	8	8	2			
Dist. 9	40	82	20	26	23									10					15	34	8	10	8				
Dist. 10		4	57	2	8	5	1				6	4		3	3				1		1	1	1	3	1		
Utah					10					1		1									2		2				
West Virginia	1	10	6							1	19	16	10						2	3	5						
Wyoming			2	3	4	3					1		1		1				1	2	8	3	4	1			
Total U. S.	210	540	598	288	330	161	86	33	5	9	61	81	39	81	11	5	3	1	152	223	253	121	131	49	28	8	1
Western Canada		12	13	93	27	8					3	5	2		1					3	3	24	5	3			
Alberta		6	7	31	26	8					3	4	2		1					3	2	14	3	3			
Saskatchewan		1	5	62	1							1									1	10	2				
Manitoba		5	1																								
British Columbia																											

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Breakdown of Wildcats Drilled in September 1957, by Depth

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Arizona																				1							
Arkansas			2											1						3	7	3	2				
California					3	1		1						1					1	4	3	3	11	4	5	1	
Colorado				1	2																2	13	15	3			
Idaho																				1		1					
Illinois		2	3																7	19	13						
Indiana																			3	6							
Kansas				8	1									1						4	14	31	6				
Kentucky	1	1																	23	7	2						
Louisiana					1		3	1		1					2	2	1				3	2	7	15	12	8	3
North					1		1			1											3	2	7	1			
South							2	1								1								14	11	7	3
Offshore															2	1	1								1	1	
Michigan		1	1																	4	2	3					
Mississippi					2																1		10	4	1		
Montana													1							3	5	6	5	1	2		
Nebraska				1	4																2	5	24	1			
Nevada																			1	1	1						
New Mexico					1															5	2	2	6		1	1	
Northwest					1															2			3				
Southeast																				3	2	2	3		1	1	
New York																						2					
North Dakota					2	1															6	4		2			
Ohio																					1						
Oklahoma	1		2		8	3		1		1				2	1				6	7	12	13	12	3			
South Dakota																				1	5			1			
Tennessee										1		1	1						10	8	5		2				
Texas		5	4	9	11	6	4				1			3					21	82	44	48	68	31	8	3	1
Dist. 1							1												10	7	3	3	1	1			
Dist. 2				2	2	1																2	4	1			
Dist. 3							1							1							2	2	6	13	3		
Dist. 4			1	2		2													1	3	5	2	10	7	1	1	1
East					2														1	5	3	6	15	1	1		
Dist. 7-B		3	2	3	4														1	26	13	8	9				
West					1	1	2				1								5	12	9	10	11	5	2	2	
Dist. 9		2	1	2	2									2					3	28	9	14	10		1		
Dist. 10						2														1		1	2	3			
Utah																				3	1	1	3				
West Virginia														1									2				
Wyoming					1	3													2	1	2	1	5	5			
Total U. S.	2	9	12	19	36	14	7	3		3	1	2	1	9	3	2	1		74	160	133	138	178	70	29	13	4
Western Canada			4	3	8	3					2	1	2	2	1					9	13	19	6	2		1	
Alberta			2	1	5	3						1		1						3	6	4	2	2			
Saskatchewan			2	2	1						2									3	4	14	4				
Manitoba																				3	3						
British Columbia					2								2	1	1							1				1	

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Footage Breakdown for September 1957

	Fields			Wildcats		
	Oil	Gas	Dry	Oil	Gas	Dry
Alabama	26,448	.....	.....	.....	.....	533
Arkansas	188,869	2,686	68,502	6,532	5,475	55,061
California	586,068	13,100	59,703	40,763	5,118	186,745
Colorado	95,569	28,095	39,747	18,480	.....	184,237
Illinois	276,140	1,045	179,458	12,830	.....	77,911
Indiana	31,710	.....	53,859	.....	.....	13,312
Kansas	456,844	58,382	334,668	39,318	5,418	221,880
Kentucky	44,343	37,364	60,024	2,317	.....	31,283
Louisiana	1,148,236	165,129	715,916	54,449	55,662	480,322
North	190,244	32,736	121,229	17,899	1,080	68,004
South	749,802	91,488	410,111	36,550	12,457	386,973
Offshore	208,190	40,905	184,576	.....	42,125	25,345
Michigan	60,980	9,578	40,436	4,926	.....	26,347
Mississippi	114,641	.....	60,478	14,072	.....	111,034
Montana	52,830	6,169	3,743	.....	3,585	109,601
Nebraska	106,192	.....	63,504	30,377	.....	189,987
New Mexico	506,884	248,039	78,545	5,980	.....	80,252
Northwest	92,782	238,845	11,336	5,980	.....	19,318
Southeast	414,102	9,194	67,209	.....	.....	60,934
New York	17,000	.....	18,000	.....	.....	9,342
North Dakota	62,688	.....	.....	20,289	.....	56,003
Ohio	103,756	47,263	44,884	.....	.....	3,494
Oklahoma	954,779	79,520	439,024	95,988	24,064	212,226
Pennsylvania	22,780	98,683	35,130	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	24,804
Texas	4,184,345	308,070	1,082,178	224,644	19,654	1,328,234
Dist. 1	120,390	49,956	33,662	11,471	.....	56,446
Dist. 2	90,443	83,870	100,223	29,050	.....	41,439
Dist. 3	419,326	8,827	173,562	10,514	5,964	191,436
Dist. 4	270,103	19,117	135,021	27,505	.....	189,807
East	375,485	.....	50,608	12,829	.....	154,266
Dist. 7-B	325,874	8,588	202,862	50,113	.....	172,560
West	1,782,830	10,135	146,979	38,125	1,384	257,095
Dist. 9	501,676	59,474	189,332	26,898	12,306	219,416
Dist. 10	298,218	68,103	49,929	18,139	.....	45,769
Utah	59,134	3,614	17,886	.....	.....	33,058
West Virginia	36,627	129,947	22,923	.....	5,439	12,360
Wyoming	73,750	14,446	76,687	30,358	.....	86,454
Arizona	.....	.....	.....	.....	.....	2,200
Tennessee	.....	.....	.....	.....	7,501	40,071
Idaho	.....	.....	.....	.....	.....	5,900
Nevada	.....	.....	.....	.....	.....	5,985
Total U. S.	9,210,613	1,251,130	3,495,295	601,323	131,916	3,588,636
Western Canada	701,288	39,307	157,305	101,803	36,165	204,406
Alberta	384,235	36,254	96,825	67,126	8,835	69,455
Saskatchewan	303,811	3,053	60,480	20,875	4,396	102,239
Manitoba	13,242	.....	.....	.....	.....	15,272
British Columbia	.....	.....	.....	13,802	22,934	17,440

per day from Oil Creek - Ordovician sands at 16,525-46 ft. Total depth is 17,484 ft., fourth deepest well in the state.

Not far away the state's deepest hole, and for a time a threat to the world's record hole, Magnolia Petroleum Co. 1 Sterba-Ordovician, stopped at 20,446 ft This Cement field well in Caddo County will attempt to complete in the Springer at 14,510-40 ft.

New Michigan hope . . . A well in new Scipio field, Hillsdale County, flowed 148 bbl. of oil hourly from Trenton-Ordovician to give Michigan a drilling interest revival. Aurora Gasoline et al 1 Stevens, fourth well in the field, lost circulation while drilling in the Trenton, blew out, flowing wild for 25 hours before being killed. Location of this field is on the southeast rim of the Michigan basin and Scipio's success will go a long way toward bringing lagging exploratory interest in the Wolverine State back to par.

More Palo Duro oil . . . Shell Oil Co. completed its second and third discoveries in the Texas Panhandle's recently opened Palo Duro basin. Both strikes, the 1 Alamosa Ranch and 1 L. S. Ranch, are in Oldham County. The first well, 11 miles northwest of Vega and 5½ miles southeast of the original basin-opener, flowed 612 bbl. of oil per day from Missouri-Pennsylvanian granite wash at 7,122-32 ft. and 7,137-43 ft. The latter well, 15 miles north of Vega, swabbed 31 bbl. of oil per day from the Des Moines-Pennsylvanian granite wash at 8,526-58 ft.

Rank Smackover production . . . Pan American Petroleum Corp. completed 1 T. L. James & Co., Inc. in Union Parish, North Louisiana, as a 229-bbl. Smackover discovery from perforations at 10,354-68 ft., moving Smackover oil into a rank area 14 miles northwest of Bernice-Smackover field. The new field's name is Farmerville.

Illini come back . . . Douglas County's Arcola area is the scene of Illinois' biggest development play this year, giving a much-needed drilling push to the lagging basin. The area concerned is 1 mile west of Arcola at East Chesterville. Since the discovery well was completed in July there have been about 40 wells completed in this new field. The discovery well, Pierce et al. 2 Susan Munson, flowed 1,250 bbl. of oil per day from Rosiclare sand. Other wells have made even more. **End.**

BOOKS

ANALYSIS OF AVAILABLE DATA ON SECONDARY RECOVERY IN OKLAHOMA published by Research Oil Reports, 307 N. Broadway, Oklahoma City.

A review of the water-flood activity in Oklahoma oil fields has been prepared for immediate distribution. Data assembled cover more than 360 water-flood projects. Among the outstanding areas are: Burbank, Sholem, Olympic, Jones, Mount Vernon, Canary, and others. More than 200,000 acres are being flooded with excellent results in many instances and applications to flood many additional areas have been approved, according to the report.

Production statistics in each of the flood units reviewed generally cover 11 months in the last half of 1956 and the first half of 1957. Efficiency factors, daily oil production, daily water production, amount of water injected daily and other figures are included in most instances.

SECONDARY RECOVERY RAILROAD COMMISSION HEARING SUMMARIES, 1953-55 inclusive, 8 volumes. Published by Texas State House Reporter, Box 2195, Capitol Station, Austin, Tex.

Here for the first time is a complete summary of every water-flood project in Texas. Each secondary project must be authorized by the Texas Railroad Commission and prior to granting this permission, a hearing is held at which the water-flood plans are explained. These eight volumes contain reservoir data, predicted recoveries, etc., on all water-flood projects from the initial flood hearing, covering in many instances only a single lease, to the present status as revealed by the latest hearing.

EXPLORATION THIS WEEK

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EXPLORATION HIGHLIGHTS

APPALACHIAN

OHIO

New Field Near Gratiot Grows Rapidly

Development of both oil and gas production over a large area southwest of Gratiot in Hopewell Township, Muskingum County, is progressing rapidly. Oil Development Co. 2 G. L. Porter, Section 4-S, with Clinton at 3,194-3,251 ft. gaged 700,000 cu. ft. natural and 3,000,000 cu. ft. after fracture.

The greatest concentration of drilling activity is in Franklin Township, Wayne County, and the resulting field is expected to be the richest pool discovered in the state in the last quarter century. The Oriskany sand gaged 7,000,000 cu. ft. in one well in the north part of the pool, but was drilled into the water, the Newburg is showing gas in several wells and oil in one well to date. The main producing sand is the deeper Clinton sand with 16 producers and 2 dry holes. About 25 rigs are now running with several more expected to start in a short time. The pool will probably acquire the name of Moreland from a small village nearby.

PENNSYLVANIA

Operator Prepares to Fracture Buffington Wildcat

In Buffington Township, Indiana County, southwestern Pennsylvania, Columbian Carbon Co. is preparing to fracture the 1-1845 Bethlehem - Cuba Iron Mines wildcat. The Onondaga was found at 8,114 ft., chert at 8,128 ft., with gas gaging 712 M.c.f. The Oriskany sand is at 8,220 ft. The well is shut down at 8,226 ft.

WEST VIRGINIA

Randolph County Wildcat Flows Oriskany Gas

In Dry Fork district, Randolph County, Hope Natural Gas Co. 10076 U. S. Department of Interior was successful in the Oriskany sand gaging 959 M.c.f. of gas after fracture. The sand was topped at 5,570 ft., and total depth 5,897 ft.

Cabin Creek District Wildcat Is Failure

In Cabin Creek district, Kanawha County, Pure Oil Co. 372 Williams Coal Co., deep wildcat test, was a failure. Total depth was 6,272 ft. Some oil was found in the Berea sand. Oriskany sand was at 6,224-25 ft.

EASTERN KENTUCKY

Deep Wildcat Test Fails

United Fuel Gas Co. 1 David Ward, a wildcat test for Martin County has ended in failure. A deep test for the area, the well logged Corniferous lime from 3,072 to 3,788 ft., Big Six (Silurian) sand 3,788 to 3,832 ft. and Clinton 4,168 to 4,208 ft. Total depth was 4,215 ft.

CALIFORNIA

Union Working on Promising Wildcat in Saugus Region

Union Oil Co. of California was preparing to plug bottom perforations in an 11,545-ft. wildcat near Saugus. in Los Angeles County, when the well turned to water 1½ hours after it was bled off. Water entry was found at 10,-650-10,750 ft. During the 1½ hours, the well flowed 27 bbl. of 26°-gravity crude. The well was perforated in two zones, at 10,624-10,841, and 10,077-10,539 ft. This wildcat is in SW NW 15-4n-16w, about 2½ miles south of Honor Rancho field.

Two More Wells Boost Tapia Canyon Activity

Intex Oil Co. is putting finishing touches on two new wells in its Tapia Canyon activity just north of Honor Rancho field in Los Angeles County.

One, 3 Yule, is about ½ mile northwest of the other three wells in the main area. This extension is being completed with 123 ft. of perforations below 876 ft. Total depth is 1,070 ft.

The other, Lackie-USL, is completed at 1,226-1,302 ft. Total depth is 1,302 ft. No production figures are available now, but the other three producing wells in the field are making a total of about 250 bbl. daily of 17°-gravity crude.

New Oil Producer Extends Riverdale-Northwest Area

Occidental Petroleum Corp. is completing 82A-7 Burrel in the Riverdale Northeast area of Fresno County. First reports give it a potential of more than 300 bbl. daily. It was brought in flowing 300 bbl. daily through 14/64-in. choke. Through 10/64-in. choke it flowed 200 bbl. daily. After 28 hours through that choke, it was pinched back to 7/64-in. choke and put on production making 100 bbl. daily. This well is the most easterly of Occidental's wells in the area.

CANADA

ALBERTA

Second Devonian Zone Produces at Innisfail

Dernick Guyer Oil Co. has proved the Devonian "D2" zone productive in the Innisfail area, 60 miles north of Calgary, in southern Alberta. This gives the area its second pay, initial production having been in the D3 zone, discovered by a group headed by Canadian Oil Companies, Ltd.

Drilling activity at Innisfail still is going along at a fair rate. Twelve rigs currently are running at 3 rank wildcats, 1 step-out test, and 8 development wells. Six wells in the region have proved successful of oil production from the discovery horizon in an area 2¾ miles long and ½ mile wide.

The newest strike for the area, Dernick-Guyer's Innisfail No. 9-17-35-1 venture, on LSD 9, 17-35-1w5, is 1¾ miles northwest of the White-Rose-C. & E. Innisfail No. 1-16 discovery hole, the closest producer.

Drill-stem test in the D2 zone covered a 45-ft. interval below 8,310 ft. Pipe recovery of 750 ft. of gas-cut oil, and 195 ft. of gassified oil-cut mud was made. A test in the D3 zone, which covered 12 ft. of that structure, sprayed oil to surface, and, during the 24 minutes the tool was open, 760 ft. of gassified oil entered the drill pipe.

New East Calgary Well Records Large Gas Flow

The largest open-flow potential yet indicated for any well in the East Calgary gas area's Consolidated (D1) zone is reported for Jefferson Lake Sulphur Co.'s Canadian Pacific-North Calgary 25-11, on LSD 11, 25-25-29w4.

This new well, testing an 111-ft. section in the Crossfield, flowed at the rate of 50,000,000 cu. ft. of gas daily.

It is the third successful completion for the company in the field, which fast is shaping up to be one of southern Alberta's best potential gas areas. Three prolific gas zones have been uncovered so far.

This well earlier discovered a wet-gas bearing zone in the basal Blairmore

by flowing, during drill-stem test, at the rate of 4,300,000 cu. ft. daily and recovered 40 bbl. of condensate. Test was open 8 hours. A drill-stem test in the D1 zone flowed at the rate of 5,200,000 cu. ft. daily. When that rate was recovered from the D1 horizon it was thought that a better-than-average well had been indicated.

The new success, like the previous wells drilled by Jefferson Lake in East Calgary field, is designed to prove sufficient hydrogen sulfide-bearing gas reserves in the D1 to warrant construction of a large sulfur processing plant in the immediate area.

Jefferson has a perfect score to date, having indicated gas success from the Mississippian horizon at one other venture 2 miles west-southwest, and also proved another D1 gas well 6 miles south of the newest completion. There are three other gas wells in the D1 zone drilled previously by Mobil Oil of Canada, Ltd.

Long Extension Indicated For Gordondale Gas Field

Canadian Fina, Royalite and Devon-Palmer, which jointly own and operate Gordondale gas field, 240 miles northwest of Edmonton, report their Gordondale 11-17, 3½ miles southeast of the proved limits of the field, has penetrated the Paddy formation which has a gross pay section of 28 ft. This well was drilled as the second exploratory test on a recently acquired gas license. Drilling and testing are continuing.

The drill-stem test that indicated production was from the interval at 2,750-80 ft. with valve open 60 minutes. Gas surfaced in 1½ minutes at maximum rate of 3,200,000 cu. ft. per day with no sign of formation water. The Paddy sand was encountered at 2,755 ft.

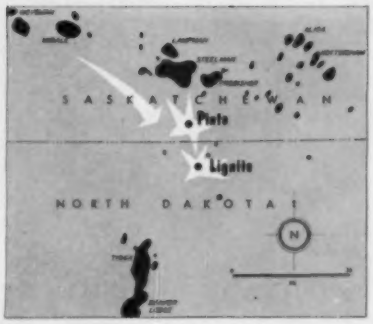
The first well on the gas license, Gordondale 10-19, in LSD 10, 19-79-9w6, was completed as a gas well and flowed 2,500,000 cu. ft. per day on drill-stem test.

SASKATCHEWAN

Pinto Discovery Raises Midale's Importance

An important Midale - Mississippian discovery 10 miles of Steelman field in southeastern Saskatchewan flowed 300 bbl. of oil per day, 40° gravity, from the 5,200-ft. zone. The well is Canadian Oil Companies and Colorado Oil & Gas Co. 16-35 Pinto, LSD 16, 35-1-5w2, about 20 miles southeast of Estevan.

This new strike is located about 12 miles north of North Dakota's most active new area, Lignite field in Burke



A flowing Midale-Mississippian oil discovery 10 miles south of Steelman field in southeastern Saskatchewan opens an entire new area for exploration for this zone. The Canadian Oil Companies et al strike is about 12 miles north-northwest of booming Lignite-Midale field in Burke County, North Dakota.

County. Both fields produce from Midale. The Pinto well is in an area of little previous drilling. The Midale strike moves production from this zone in Saskatchewan to its southernmost point. This plus the success at Lignite raises an important exploratory hope for this section of the Williston basin.

KANSAS

Flowing Oil Tested at Trego County Wildcat

Jones, Shelburne & Farmer tested flowing oil at the 1 Martin wildcat in SW SE NE 28-11s-24w, northwestern Trego County.

A drill-stem test in the Lansing at 3,990-4,013 ft. flowed oil in 58 minutes. Location of this new discovery is 6½ miles southwest of Diebolt pool and 6 miles northwest of the town of Wakeeney, Kans.

Two-Zone Discovery Indicated in Pawnee

Northeastern Pawnee County has an indicated two-pay discovery at D. R. Lauck 1 Wedel in NE NE SE 14-21s-16w.

The operator has set 4-in. casing after a drill-stem test got gassy oil in the Arbuckle. The test also recovered gas and oil-cut mud. Location is 1 mile west of Sweeney pool and 3 miles northeast of the town of Larned.

Gage Broke at Gas Extension in Spivey-Grabs

Petroleum, Inc., is testing at a high volume gas well extension to Spivey-Grabs field in Kingman County.

The well, located in C NW NW 4-30s-8w, 1 mile north of production in this southern Kingman County field, flowed an estimated 11,000 M.c.f. on test in the Mississippian. The high flow broke the gage.

LOUISIANA

SOUTH LOUISIANA

New Oil Producer Splits Reeves-Bunchy Creek Gap

A wildcat located about midway between Reeves and Bunchy Creek fields, in southern Allen Parish, has proved productive from Frio sand at 6,227-35 ft. It opens what is believed to be an entirely new area in the 5-mile gap separating those fields. Reeves is productive from a 5,900-ft. Frio sand, and Bunchy Creek at 6,350 ft.

The new discovery is by Thomas Jordon, Inc., of New Orleans at 1-A Industrial, in 29-6s-6w. The well is good for 80 bbl. of 30°-gravity oil per day, flowing through 7/64-in. choke with pressure of 960 psi. Hole had been drilled to 7,807 ft. Drilling is under way at a confirmation test, a location south of ths discovery well.

Second Couba Island Well Opens Deeper Production

California Co.'s second well in its recently opened Couba Island field, on the southwest shore of Lake Cataquatche in southeastern St. Charles Parish, is opening a new pay about 2,000 ft. below that of the discovery well.

The new well, 2 Tilken, northwest of the discovery well (No. 1), is perforated at 7,923-44 ft., from which pay it flowed 123 bbl. of oil per day through 7/64-in. choke. Flow was with gas-oil ratio of 781 cu. ft. per barrel and pressure of 1,250 psi.

The discovery well's pay is perforated at 5,836-44 ft. It was completed last June as a gas producer. The company's third test, now drilling, is about 1,500 ft. southeast of the discovery well.

The area is about 15 miles southwest of New Orleans. It is about 5½ miles northeast of Bayou Couba field, nearest other produpction.

Outpost Test Extends Lake Enfermer Limits

Productive limits in the Lake Enfermer area. Lafourche Parish, continue to expand. Latest extension is at a northwest stepout test drilled by Olin Gas Co., H. L. Hunt, and Mississippi River Fuel Co.

Their extension well, 1 Lafourche Realty-Grandison Unit B, is productive from Miocene sand at 12,892-12,802

it. Its flow through 15/64-in. choke was at the rate of 135 bbl. of 59°-gravity condensate and 4,150,000 cu. ft. of gas per day.

Pressure was 4,250 psi., flowing, and 4,550 psi., shut in. Total depth is 13,070 ft.

Fourth Attempt Confirms Dalcour Field Discovery

Mecom Petroleums, Inc., has confirmed its discovery more than a year of production in the Dalcour area, southeast of New Orleans, in Plaquemines. Since the discovery well was completed, in June 1956, three deep dry holes have been drilled in the area.

Confirmation well is 4 Delacroix, productive from perforations at 10,077-79 ft. in the deeper of two zones in which the discovery well, 2 Delacroix, was completed. It produced 137 bbl. of oil per day with 541,000 cu. ft. of gas, gaged through 5/32-in. choke. Gravity of the oil is 39.5°. Flow was under pressure of 3,400 psi.

Location is about ½ mile south of the discovery well. The latter produces from perforations at 10,036-42 ft. It also is productive from an 8,900-ft. sand.

MICHIGAN

Fishing Delays Opening First Ingham Oil Field

A fishing job is delaying completion of Ingham County's first indicated commercial oil well. Bailer was lost in the hole while operators were attempting to bring the well in for production test.

The well, drilled by Three Lakes Oil Co., had showed for 800 ft. of oil natural in the hole after 5-in. casing, with perforated joint on bottom, had been set at 2,468 ft.

Bottom is in Traverse limestone with pay from 2,440 ft. Top of the section is 2,419 ft.

The well, 1 Clark, in the SE SW NW 2-4n-1e, Williamson Township, is 12 miles east of Lansing.

NEW MEXICO

SOUTHEAST NEW MEXICO

Eddy County Wildcat Flows on DST

An Eddy County well on west end of the Artesia-Maljamar-Vacuum trend made a heavy flow of oil while drill-stem testing the Abo. The formation is in the Wolfcamp series, or lower Permian.

Pan American Petroleum Corp. 1-A Malco Refineries, in 11-18s-27e, flowed 116 bbl. of 46°-gravity oil in 2 hours while drill-stem testing at 6,062-6,100 ft. Gas volume was at the rate of 1,619 M.c.f. per day.

An earlier test, at 5,980-6,050 ft., flowed 292 bbl. of oil in 13 hours and 40 minutes. Chokes and pressures were not reported.

Pan American has full interest in the well and in some 2,000 acres in the immediate area. Nearby production in Artesia field is from the upper Permian around 3,000 ft.

Lea County . . . Development drilling in the new Seaman Ranch area fields of west-central Lea County included two heavy producers by Pure Oil Co. Pure Oil 1-E State, in 21-16s-34e, 13 miles southwest of Lovington, flowed 70 bbl. of 42°-gravity oil in 15 minutes through ¼-in. choke. The well was said to have had a new pay thickness of 93 ft. Total depth was 11,483 ft.

Pure Oil 1 State, in 34-16s-33e, flowed 246 bbl. of oil in 6 hours through ⅜-in. choke, from a 70-ft. net pay section. Total depth was 11,842 ft. Pay section in both wells is the Permo-Pennsylvanian.

NEVADA

Reported Abandonment In Error

West End Opeteca Mines Co. and Janoil Corp. were moving in a rotary to deepen 28-1 U.S.L. in White Pine Valley, Nye County, contrary to earlier reports that it was being abandoned. Now at 700 ft., the well will be deepened to 1,100 ft., according to West End.

OKLAHOMA

NORTHWEST

More Pay Tested at Woodward Discovery

The upper section of the lower Morrow sand was perforated at Sinclair Oil & Gas Co.'s 1 Gilbert in C SE NW 1-23n-20w, Woodward County discovery. Gas-distillate flowed from perforations at 7,567-71 ft. on tests.

A 105-minute test in the lower part of the lower Morrow sand showed gas in 5 minutes at the rate of 2,530 M.c.f. per day. Recovery was 20 gal. of distillate.

The well then flowed 1,698 M.c.f. per day on 8-hour test through 10/64-in. choke from perforations at 7,523-38 ft. after swab. There was a trace of distillate on this test.

Eastern Woodward . . . The second producer was added to the new pool in eastern Woodward County opened recently by Shell Oil Co.

Shell's 1 Garvie-B, C SE NW 23-22n-17w, flowed 13,000 M.c.f. of gas per day on 1-in. choke from Chester-Mississippian perforations at 7,137-64 ft. The third well has been located in C SW NE 24-22n-17w, at 1-24 State.

New Wildcat Staked in Revived Ellis Pay

Pan American Petroleum Corp. will drill another wildcat in Ellis County. The new one is 1 Sutter Unit in C SE NW 19-22n-23w, 11 miles southwest of the same firm's 1 Tune discovery in C NW SE 35-24n-23w. The new well will go to 9,200 ft.

The operator is perforating at 1 Tune in the Morrow zone.

Pan Am has reportedly located other wildcats in this section of the state. One is in western Ellis County near the Texas line in 9-22n-26w; the other is west of 1 Tune in 34-24n-23w.

Cherokee Reservoir Grows At Dacoma in Woods County

The Cherokee sand reservoir in Dacoma field, Woods County, was extended by Amerada Petroleum Corp. at its 1 Morse in NW NW 25-25n-13e.

A drill-stem test at 5,917-69 ft. surfaced gas in 3 minutes at 734 M.c.f. and then increased to 957 M.c.f. in 4 hours. Recovery was 210 ft. of fluid of which 10 ft. was muddy distillate and 1 ft. of clean distillate. Another test is now being made at 5,966-6,044 ft.

Calvert-Phillips opened the Cherokee sand portion of the pool in SW SE 19-25n-12w. The well made 84 bbl. of distillate and 10,600 M.c.f. of gas per day. Amerada then opened Simpson sand production in NW SE SW 24-25n-13w for 388 bbl. of oil per day. The 1 Morse also flowed 10,270 M.c.f. of gas and some distillate from the Osage-Layton on tests.

PANHANDLE

First Morrow Oil Well Completed at Highland

The first Morrow oil well was completed in Beaver County's Highland field by Sinclair Oil & Gas Co. The 1 Whisenhunt, C NE SW 3-3n-28eCM, flowed 264 bbl. of 43.5°-gravity oil in 22 hours on 1-in. choke with 450 M.c.f. of gas per day.

The Morrow discovery also flowed 1,180 M.c.f. of gas per day and 3 bbl. distillate in 10 hours on ¾-in. choke from Hoover perforations at 4,350-4,400 ft.

SOUTHEAST

Wild Gas Well Killed In McIntosh County

Brannan & Farrell have killed a wild gas flow at the 1 Lackey wildcat in SE SE NE 14-12n-16e, McIntosh County. The blowout was at 2,242 ft. when the well flowed 50,000 - 70,000 M.c.f. of gas per day. Casing has now been landed at 2,246 ft. Location of this new discovery for the northwestern part of the McAlister basin is northwest of Checotah.

SOUTH-CENTRAL

East Noble Field Extended in Cleveland

Cleveland County's East Noble field was extended at Trice Production Co. and Fain - Porter Drilling Co. 1-C French, SE NE SW 29-8n-1w. The flowing Tulip Creek-Ordovician well flowed 200 bbl. of oil in 4½ hours on ½-in. choke from perforations at 7,930-35 ft.; on 10/64-in. choke it made 133 bbl. per day.

Production Tests Taken At South Glenwood Well

Shell Oil Co. 1 Lonker-C apparently is a new Morrow well for the southwest side of Beaver County's South Glenwood field, C SW NE 2-5n-27eCM.

The well flowed 19,500 M.c.f. of gas per day on ½-in. choke from Morrow sand perforations at 6,199-6,223 ft. plus 11 bbl. condensate per million. Shell found the Chester-Mississippian at 6,222 ft.

OREGON

GP Drilling Ahead

General Petroleum Corp. was drilling ahead below 8,749 ft. on 1 Long Bell in the Sulphur Springs-Siuslaw region of Douglas County.

ROCKY MOUNTAINS

NORTH DAKOTA

Two Williston Wildcats Shape Up As Producers

North Dakota continues to make exploration news with two wildcats testing potential pays. Northwest Oil Drilling Co. recovered oil-strained cores in its 1 Olson (NW NE 18-162n-90w), 2 miles south of Flaxton and 5 miles east of Lignite field. The indicated discovery is producing from the Midale and Nesson pay zones of Madison limestone.

Amerada Petroleum Corp. has a dual-zone discovery 4 miles west of Fryburg field with production from Fryburg pay of Madison limestone. The 1 Scoria Unit (see map p. 171), flowed at the rate of 231 bbl. of oil in 23 hours, through a 24/64-in. choke, plus 11 bbl. of water. The zone tested was in the Madison limestone, topped at 8,883 ft. In addition, the Heath zone yielded 109 bbl. in 13 hours through perforations 7,966-76 ft.

MONTANA

Sweetgrass Arch Tests Report Good Oil Shows

Murphy Corp. plans to complete its 1 State (NE SE 23-37n-6w), barefoot after logging shows of oil in two tests of the Madison limestone. Interval 3,255-75 ft. yielded 230 ft. of oil and gas-cut mud and interval 3,271-80 ft. got 200 ft. of oil and gas-cut mud. Operator has set oil-string on top of the Madison. The Murphy well is 2 miles south of Blackfoot field, and 3 miles northwest of Cut Bank field.

Sinclair Oil & Gas Co.'s Devonian test in Teton County (NW NW 9-27n-6w), had a slight show in the Madison. Drill-stem test of the interval 3,285-3,301 ft. recovered 120 ft. of slightly oil-cut mud. The well is 12 miles west of production in the old Pondera field.

UTAH

Utah Lists Field Names And Producing Limits

Utah's Oil and Gas Conservation Commission has officially named and defined the rapidly growing oil and gas fields in the state. The state now boasts 46 separate producing areas. Many of these are mushrooming in all directions as operators stake new locations daily. Carter Oil Co. is kicking off an aggressive exploitation campaign in the newly discovered McElmo Creek field, San Juan County, with 7 new locations. These wells are adjacent to, or offsetting Carter's discovery at McElmo Creek that flowed 2,330 bbl. per day. Several other wells have been completed in the field.

Many of Utah's wildcats and field wells are now being drilled as tight holes because of the impending Navajo lease sale.

Here are the names of the Utah fields, county locations, and the field limits, by sections:

Akah, San Juan, 28, 33-42s-22e.
Aneth, San Juan, 1, 12, 13, 14, 2, 11, 15, 23, 24-40s-23e; 5-10, 13-27, 3, 4, 11, 12, 28, 29-40s-24s; 19, 30, 29-40s-25e.
Ashley Valley, Uintah, 22, 23, 24, 25, 26-5s-22e.
Big Flat, Grand, 11, 14-26s-19e.
Bluebell, Duchesne, 3-1s-2w.
Bluff, San Juan, 32, 33-39s-23e; 4, 5-40s-23e.
Boundary Butte, San Juan, 8, 9, 10, 15, 16, 17, 21, 22, 23, 27-43s-22e.
Brennan Bottom, Uintah, 13-7s-20e; 17, 18-7s-21e.
Cahone Mesa, San Juan, 21, 22, 27, 28-40s-25e.
Chapita Wells, Uintah, 28-9s-23e.
Chinle Wash, San Juan, 4, 5, 8, 9-43s-21e.
Cisco Dome, Grand, 24, 25, 36-20s-21e; 30, 31-20s-22e.
Clay Basin, Daggett, 15, 16, 18, 20, 21, 22, 23, 27, 28-3n-24e.
Clear Creek, Carbon & Emery, 17, 18, 19, 20, 29, 30, 31, 32-13s-7e; 5, 6, 7, 8, 17, 18, 19, 20, 29, 30, 31, 32-14s-7e; 24-14s-6e; 5, 6-15s-7e.
County Field, Duchesne, 25, 36-3s-5w.
Desert Creek, San Juan, 25, 26, 35, 36-41s-23e; 1, 2-42s-23e.
Duchesne Field, Duchesne, 16, 17-4s-4w.
Farnham Dome, Carbon, 12, 13-15s-11e; 7, 18-15s-12e.
Ferron, Emery, 22-20s-7e.
Flat Canyon, Emery, 23, 26, 27-16s-6e.
Flat Mesa, Duchesne, 16-3s-5w.
Gordon Creek, Carbon, 24-14s-7e; 19-14s-8e.
Gothic Mesa, San Juan, 31-40s-23e; 36-40s-22e; 1-41s-22e; 6-41s-23e.
Gusher, Uintah, 10-6s-20e.
Harley Dome, Grand, 29, 30, 3, 32, 33-18s-25e; 3, 4-19s-25e.
Ismay, San Juan, 15, 16, 17, 20, 21, 22-40s-26e.
Joe's Valley, Sanpete, 8, 17-20, 29-15s-6e.
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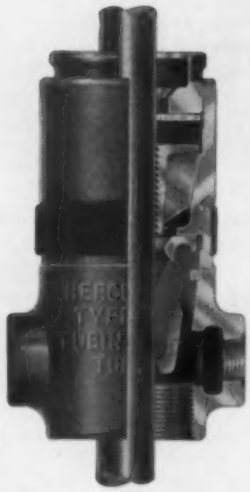

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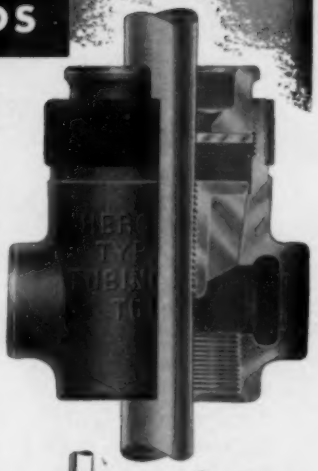

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TEXAS

NORTH TEXAS

Recompleted Gas Well Makes Oil Discovery

Lone Star Producing Co. has filed oil discovery application for a workover well in the Boonesville gas field, 7 miles south of Bridgeport, in southwestern Wise County.

New perforations in the conglomerate at 5,170-84 ft. flowed 121 bbl. of 42.5°-gravity oil a day through 20/64-in. choke. Tubing pressure was 190 psi., with gas-oil ratio of 1,774:1.

Old total depth was 6,099 ft. Original completion was for 2,400 M.c.f. of gas from conglomerate at 5,928-6,099 ft. Location is in the J. M. Wesson Survey, A-877. Operator has requested new field designation as Southeast Lake (5,170-ft. conglomerage) field.

Caddo Opener in Stephens County

Depletion as a Mississippian producer and recompletion as a Caddo discovery was reported by McElroy Ranch Co. for its 1-B D. G. Stover. The well originally was completed as the discovery of Stover-Mississippian field, from pay around 4,700 ft.

On the workover project, operators plugged back to 4,292 ft. and perforated in the Caddo at 3,968-78 ft. Potential was 293 bbl. of oil a day through ¼-in. choke on tubing set at 3,923 ft. Gravity was 43°, with gas-oil ratio of 1,740:1.

Location of the well is in Section 3, Block 8, T&P Survey, 16 miles northwest of Breckenridge.

Taylor County . . . Jocelyn-Varn Oil Co., Wichita, Kans., had prospects of a second pay zone in an offset well to its recently opened Fry sand discovery 3 miles south of Shep townsite.

The offset is 2 Helen Howarton, J. Walker Survey 460, Subdivision 39. A drill-stem test said to be around 4,570 ft. recovered 560 ft. of oil and 40 ft. of oil-cut mud from the Capps limestone. Shut-in pressure was 1,640 psi. Operators cored ahead after the test.

No. 2 Howarton is a southeast offset to 1 Howarton, a 422-bbl. Fry sand discovery at 4,676-87 ft., which had water in the Capps lime.

Deep test planned . . . A shallow Flippen sand area 6 miles northeast of Tuscola in Taylor County will be tested to 5,000 ft. at Davisson & Fitzgerald, Abilene, 3 Lula M. Fletcher. Location is in Section 5, Block 1, SPRR Survey.

EAST TEXAS

Possible Connection Seen for NE Hallsville, Woodlawn

Opening of Pettet gas production to the northeast of Hallsville, Northeast field, has aroused some speculation as to the possibilities of linking the field with the big Woodlawn field in Harrison County.

The well is Hunt Oil Co. 1 L. N. Futrell, Francosco Cavilla Survey, A-139, which is about 4 miles northwest of Marshall townsite. It was shut in for pipe line connections after flowing at the rate of 1,470 M.c.f. a day through 12/64-in. choke, from perforations at 6,822-36 ft. Flowing pressure was 1,860 psi. and gas-oil ratio was 8,700:1. Shut-in tubing pressure was 2,250 psi.

This is the first Pettet gas production in Hallsville, Northeast field, which lies to the southwest. It is approximately 1 mile from nearest Pettet gas production in Woodland field.

Deepening slated in Bowie . . . Revilo Royalty Co., Dallas has filed application to re-enter and drill ahead on its 1 C. L. Dodd, 9 miles southwest of Texarkana in southwestern Bowie County.

The well was drilled dry earlier this year to 4,510 ft. New contract calls for 9,000 ft. to test the Smackover limestone. Nearest production is 4 miles to the southeast at the one-well Eylau field, which found small oil production in the Smackover at 7,709-15 ft.

New Woodbine zone . . . The West Slocum field of southern Anderson County took on another Woodbine producing zone at Seaboard Oil Co. 5 Harry Denson. Operators have askd for discovery allowable from the "A" zone between 5,744-50 ft. Production from that section was at the rate of 210 bbl. of 44.7°-gravity oil a day through 11/64-in. choke. Tubing pressure was 820 psi., with gas-oil ratio of 634:1.

No. 5 Denson is a dual completion. Potential on the Woodbine at 5,725-30 ft. was 125 bbl. of 45°-gravity oil a day through 10/64-in. choke. Casing pressure was 580 psi., with gas-oil ratio of 742:1.

Location is 1 mile southwest of Slocum townsite, in the W. R. Wilson Survey, A-66.

TEXAS PANHANDLE

Rank Panhandle Test Rigs Up for Finals

Rip C. Underwood 1 Moon, a prospective discovery 6 miles south of Kerrick in northeastern Dallam County, Texas Panhandle, was rigging up cable tools for completion attempt.

Previous drill-stem tests in the Cisco at 3,430-3,565 ft. tested up to 650,000 cu. ft. of gas per day, and recovered 240 ft. of heavily gas-cut mud. Flowing pressure was 250 psi. and 30-minute shut-in pressure 490 psi.

Formation tops required, on elevation of 3,817 ft., were: Brown dolomite 2,736 ft., Big lime 3,179 ft., and Cisco 3,527 ft.

Location for deep test . . . Location for a 7,500-ft. wildcat in southeastern Dallam County has been announced by Josephine P. Bay, operating from Snyder, Tex. The well will be 1 R. E. Heiskell, in Section 10, Block 1, BS&F Survey. The location is 10 miles northeast of Dalhart and has no nearby production.

WEST TEXAS

West Texas Reference Book Published

Petroleum Review, Borden County, Texas, is available from Phifer Petroleum Publications, P. O. Box 20,024, Houston.

The Borden County book is another in a series on oil and gas producing counties in West Texas. Data includes a chronology of field discoveries and production record by fields.

The list of fields includes discovery well and completion data. Production is listed by year, with number of producing wells, and cumulative production to the end of the year. Status of the field is to September 1, 1957.

Illustrations include electrical logs on discovery wells, or of typical field wells; field maps with contours plotted, and a typical geological chart for West Texas. Further information and prices may be had by writing Phifer Petroleum Publications.

Ector, Borden Counties Finish Discoveries

Completion potentials were run on two Ector County discoveries, one deep and one shallow, and on Borden County's Ellenburger strike.

In northeastern Ector County, Pan American Petroleum Corp. 1-A Fasken flowed 369 bbl. of oil and 11 bbl. of water in 24 hours, from Fusselman pay at 12,270-12,320 ft. Choke was 12/64-in. and gas-oil ratio was 814:1. Operators were also planning to complete in the Devonian between 11,540-90 ft. Location is 1½ miles north of Mac Boring field, in Section 18, Block 42, T1N, G&MMB&A Survey.

The shallow discovery is TXL Oil Corp. 1 Ector "TT" Fee, 10½ miles southwest of Odessa and 1½ miles south of Moss field.

Final gage was 92 bbl. of oil and 23 bbl. of water in 24 hours, on the pump, from perforations in the San Andres at 4,290-4,320 ft. Gas-oil ratio was 466:1.

In Borden County, Shell Oil Co. 1 J. B. Slaughter estate, 16-30-T6N-T&P, flowed 189 bbl. of oil a day through 6/64-in. choke from the Ellenburger at 8,633-42 ft.

The well also indicated production from the Strawn, having recovered oil on still another test. Field sources said the pipe was too small for dual completion.

Northern Borden County gained an 8,900-ft. wildcat by Oceanic Oil Co. The project will be 1 R. N. Miller estate, to be drilled on an 80-acre lease 8 miles northeast of Gail, 4 miles northwest of South Gail field, and 3¼ miles southwest of Shell Oil Co.'s 1-B Slaughter. Location is Section 32, Block 30, T6N, John H. Gibson Survey.

TEXAS GULF COAST

New Gas-Distillate Area Opened in Goliad County

Discovery of a new gas-condensate field, located 2 miles north of Weser in northern Goliad County is reported by Tennessee Gas Transmission Co.

Its discovery well, 1 Bomba, flowed gas under pressure of 1,500 psi. during pre-potential tests through ⅛-in. choke. Liquid recovery was at the rate of 57 bbl. per 1,000,000 cu. ft.

Pay, 300 ft. in the Wilcox section, is perforated at 8,383-90 ft. The well was drilled to 8,515 ft. It had indicated commercial showings in the upper part of the Wilcox, the Cook Mountain, and Yegua, in addition to those in the above Wilcox pay.

Nearest other production is in Doehrmann field, about 3 miles east in DeWitt County.

Miocene Gas Discovery Completed at Webster

Humble Oil & Refining Co. has a Miocene gas discovery in the Genoa-Webster area, southeast of Houston, in Harris County. Its 1 Second National Bank, 2½ miles south of Genoa townsite, is rated good for 16,000,000 cu. ft. of gas per day (absolute open-flow gage) from pay interval at 4,166-76 ft. (Miocene).

Nearest Miocene production comparable to this is at South Houston, 4 to 5 miles northwest. Location is less than ¾ mile northwest of Marginulina production in Webster field. Faulting and dry holes separate the discovery from the latter field.

Hole had been drilled to 15,461 ft., where stuck pipe forced plugging back and completion in the relatively shallow sand.

Good Oil Flow Made by Tyler County Discovery

Sinclair Oil & Gas Co. and Atlantic Refining Co. have completed their Wilcox sand discovery well on mineral fee lands south of Housh field, in Tyler County. The well, their 1 Brown Fee, in the William S. Brown Survey, A-62, flowed 279 bbl. of 44.6°-gravity oil through a 5/32-in. choke in 24 hours. Production is from the Wilcox sand exposed through perforations at 8,432-54 ft. Tubing pressure was 1,300 psi., and gas-oil ratio 1,323:1.

The well was drilled to 10,500 ft.

"Dry Hole" Opens New Pay

Gilcrease Oil Co. has converted an old dry hole in the Baldwin area, Nueces County, into a discovery well of a new oil reservoir for the multiple-pay field.

The well, 3-A Sanders, was drilled in 1935, at which time it was quit at 4,313 ft. Gilcrease cleaned out the old hole, and perforated at 3,815-33 ft.

Completed on the pump, it made 128 bbl. of oil per day. Gravity of the crude is 26°.

SOUTHWEST TEXAS

Major Extension Indicated For Mesquite Bonita Field

Promising oil showings have been obtained in a wildcat located 1½ miles south of the recently completed discovery well of Mesquite Bonita field, 9 miles southeast of Benavides, in southeastern Duval County.

The wildcat is Morgan Exploration Co. and Weaver & Sharp 6 Moos, which, in a drill-stem test at 3,114-20 ft., in Frio sand, recovered 65 ft. of oil and gas-cut mud, and 777 ft. of gas-cut and slightly mud-cut oil.

Tester was open 30 minutes through ¼-in. chokes. Working pressure was 10 psi. Bottom-hole pressures were 185 psi., initial flowing, 375 psi., final flowing, and 1,255 psi., shut in.

Hole has been drilled to 3,251 ft. and casing run to 3,205 ft. for completion.

The Mesquite Bonita discovery well, drilled by Bryan & Sibley and completed last August, is productive from Frio sand, perforated at 3,042-49 ft. and 3,092-99 ft. The discovery is only a short distance west of the active Jaboncillos Creek field, also productive from comparable Frio sands.

Shallow Hockley Field Added in Starr County

Hockley sand has proved productive in another shallow Starr County area, located about a mile southwest of El Sauz, and about 6 miles southeast of El Puerto field.

Discovery is by Consolidated Petroleum Industries at its 1 Jose Cantu, in Share 36 of Porcion 104. Pay is in the lower Hockley, perforated at 926-36 ft.

Open 8 hours, the well flowed by heads, averaging 3 bbl. per hour.

Deeper Oil Reservoir Uncovered at Yturria

Sun Oil Co. has added another oil reservoir in Yturria field, in southeastern Starr County. It is in the Vicksburg-Rincon "I" sand, topped at 4,881 ft., and is designated in this discovery as Yturria (4,900-ft. Rincon) field.

Discovery well is Sun's 4-A Chapotal, completed for 89.64 bbl. of 45.3°-gravity oil per day, flowing through 11/64-in. choke. Flowing pressure is 950 psi., and gas-oil ratio 5,143 cu. ft. per barrel.

Nearest comparable production is 8,000 ft. southwest from the Rincon 2 sand in Braulia field. Nearest other production is a location northwest from the field's 4,200-ft. Chapotal sand.

Frio County Discovery Extends Olmos Activity

Joe Bailey Oil Co.'s new Olmos discovery well 1½ miles northeast of the developing Touchstone field, in northeastern Frio County, is rated good for more than 50 bbl. of oil per day, restricted to ⅛-in. choke. The well is its 1 Herrington, in the Peter Macle Survey, 7 miles southwest of Big Foot.

Gravity of the oil is 38°. Flow is with gas-oil ratio of 200 cu. ft. per barrel and pressure of 140 psi.

Pay, topped at 3,632 ft. and drilled to 3,648 ft., correlates with the Olmos "A" sand productive in Touchtstone field.

The latter field was opened last July by H. B. Kaulbach. His discovery well, 1 MacDonald, produced at the rate of 110 bbl. of 37°-gravity oil per day through 5/32-in. choke. It was completed in open hole at 3,597-3,614 ft. Two additional oil wells have been completed. One is southwest, and the other northeast of the discovery well.

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M. J. Rathbone, President, Standard Oil Company (New Jersey)

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Two dry holes are west and southeast, respectively, of the discovery well.

The area is 12 to 15 miles northeast of Pearsall, and 7 to 10 miles southwest of West Big Foot field.

WASHINGTON

Standard's Rattlesnake Hills Test at 4,477 Ft.

Standard Oil Co. of California was drilling ahead below 4,477 ft. on 1 Rattlesnake Hills Unit in Benton County.

Successful Wildcats

WEST VIRGINIA

Randolph County, Dry Fork district: Hope Natural Gas Co. 10075 Department of Interior, elev. 3,235 ft. IP 959 M.c.f. of gas per day after fracture. Chert 4,421 ft., Oriskany sand 5,570 ft., gas 5,702 ft., Helderberg 5,753 ft. TD 5,897 ft.

SOUTH LOUISIANA

Plaquemines Parish: Tidewater Oil Co. 1-A Abercrombie, 4-21s-29e (1 mile south of Bastian Bay field). IP 4,698 M.c.f. daily, 5/32-in., gas, TP 8,100 psi., perforations 13,652-58 ft. TD 14,600 ft. (New field.)

St. Mary Parish: British-American Oil Producing Co. 1 Intercoastal Shipyard, 46-16s-13e (3 miles east of Bateman Lake field). Shut-in gas well, no gage, perforations 14,682-14,850 ft. TD 15,125 ft. (New field.)

LOUISIANA OFFSHORE

Plaquemines Parish: Shell Oil Co. 4 State Lease 1010, Block 26, South Pass area, Gulf of Mexico. Shut-in gas well (flowed 540 M.c.f. daily, ½-in.), perforations 3,211-21 ft. TD 9,508 ft. (New field.)

MICHIGAN

Mason County: Glen Cain 1 Lauterwasser, NE NW NW 10-19n-17w (17 miles north of Pentwater field). IP 33 BOPD, 35.7° Traverse lime 1,601-03 ft., top Traverse 1,480 ft. (New pool.)

NORTH DAKOTA

Divide County: Spartan Drilling Co. 1 Eckland, SW NW 9-162n-95w. IP 98 BOPD, (net) 18 per cent water, ¾-in., 34.8°, GOR 1,250 cu. ft. per barrel, perfs. 6,739-43 ft. (Madison). TD 6,854 ft. (New field.)

McKenzie County: The Texas Co. 1 Kerr, C SW SW 5-150n-96w. IPP 89 BOPD (net), 16 per cent water, 41.1°, perfs. 9,396-9,430 ft. and 9,440-56 ft. (Madiaon). TD 9,606 ft. (New field.)

WYOMING

Sublette County: Mountain Fuel Supp'y Co. 1 Unit, C SW SW 14-27n-114w. IP 7,400 M.c.f. daily and 85 BCPD, TP 720 psi., perf. 6,254-83 ft. (first Frontier) and 6,810-99 ft. (second Frontier). TD 7,575 ft. (New field—Dry Piney area.)

NORTH TEXAS

Wilbarger County: W. A. Moncrief, Jr. 1 Morris, 3-14-H&TC, 3 miles northwest Harrold. IPP 120 BOPD, 37°-gravity, GOR 100, conglomerate 4,879-89 ft. TD 5,109 ft., PB 4,946 ft.

Wise County: Ambasador Oil Corp. 1 R. E. Petty, J. L. Dillingham Sur., A-241, 4 miles northeast Bridgeport, OWDD, dry at o'd TD 4,305 ft. New TD 6,198 ft., perforated conglomerate 5,900-10 ft., IP 3,120 M.c.f. gas, plus 24 bbl. distillate per day.

Warren Petroleum Corp. 5 I. G. Yates, Sec. 8, W. Blount Sur., A-32, 3 miles east Vineyard. IP 164 BOPD, 42°-gravity, GOR 389, conglomerate 4,604-14 ft. TD 5,839 ft.

WEST TEXAS

Midland County: Tex Harvey Oil Co. 1-16 B. W. Floyd, 16-37-T3S-T&P, 18 miles SE Midland. Original'y completed as Spraberry discovery well for Tex Harvey field in Spraberry Trend. Old TD 12,063 ft., PB 11,192 ft., perforated Devonian 11,192-11,512 ft. IP 361 BOPD, 24/64-in., 43°-gravity, GOR 3,238, TP 900 psi. Top Devonian 11,192 ft., ground elev. 2,603 ft.

WEST CENTRAL TEXAS

Eastland County: Low Drilling Co., Inc. 1 Ed Townsend, Sec. 100, Blk. 3, Y&TC, 8 miles southwest Cisco. IPP 78 BOPD, 42°-gravity, GOR 400, Caddo 2,858-68 ft. TD 2,885 ft.

Throckmorton County: Cities Service Oil Co. 1 Swensen, Sec. 148, BBB&C Sur., 9 miles northwest Throckmorton. IPP 66.4 BOPD, 37°-gravity, perforated 4,157-74 ft. TD 5,299 ft.

Haskell County: Tom B. Medders 1 Lonie Cornelius, D. L. Winter Sur., 4½ miles northwest Stamford. IP 399 BOPD, 43°-gravity, GOR 600, TP 280 psi., 24/64-in.

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"SHERALLOY" BALL
Excellent to combat corrosion and hard enough for deep pumping. Non-magnetic.

"CERAMIC" BALL
Nearly as hard as a diamond. Non-corrosive and non-magnetic.

"STAINLESS STEEL" BALL
For ordinary pumping where little trouble is encountered.

"SINGLE SEAL" SEAT
A competitively priced stainless steel seat for routine pumping.

"DOUBLE SEAL" SEAT
For harder than usual pumping — double contact with the ball.

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A 2-piece stainless steel seat specially recommended where ordinary or fracturing sand is causing seat failures.

"SHERALLOY" SEAT
A cast alloy definitely proved resistant to corrosion. Also good for hard pumping.

For best service use the right Baird ball with the right Baird seat.

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LONG LIFE

Baird
MANUFACTURING COMPANY
P. O. BOX 380 TULSA, OKLA.

choke, Strawn sand 4,599-4,611 ft. TD 4,979 ft.

Stephens County: J. E. Connally 1 Joe Rogers, Sec. 3, Blk. 3, SPRR Sur., 7 miles north Caddo, 1½ miles north Marble Falls production. IPP 31 BOPD, 40°-gravity, GOR 350, Marble Falls 3,900-03 ft. TD 3,980 ft.

Taylor County: Jocelyn-Varn Oil Co. and Jack F. Grimm 1 Helen Howarton, J. Walker Sur. 460, 25 miles southwest Abilene, 3 miles north of North Fort Chadbourne field. IP 422 BOPD, ½-in., 49°-gravity, GOR 1000, TP 300 psi., lower Fry perfs. 4,676-87 ft. TD 5,506 ft.

Robinson-Puckett, Inc. 2 Sanders, S. V. Hamilton Sur. 67, 5 miles northwest Bradshaw. IP 123 BOPD, 16/64-in., 44°-gravity, GOR 1384, TP 100 psi., Gardner sand 4,694-98 ft.; IP BOPD, GOR 280, lower Fry 4,300-04 ft., 8D 4,902 ft. Dual completion.

TEXAS PANHANDLE

Hansford County: Humble Oil & Refining Co. 1 Hansford Gas Unit 17, Section 118, Blk 4-T, T&NO Sur. (6 miles southeast of Spearman) IP 19,800 M.c.f. daily (calculated open-flow potential), shut-in pressure 1,948 psi., perfs. 7,360-86 ft. (Morrow). TD 7,970 ft. Elev. 3,125 ft., Morrow 7,298 ft., Morrow sand 7,350 ft., Mississippi chat 7,934 ft. (New gas field.)

SOUTHWEST TEXAS

Starr County: Edwin A. Branham et al 1 Moreno, Porcion 71, Jurisdiction of Camargo, Share 108. (8 miles northwest Rio Grande City). IPP 60.49 BOPD, 22.2°, perfs. 7391/2-42 ft. (Hockley). TD 1,547 ft. (New field.)

Delhi-Taylor Oil Corp. 1-B Cameron et al, Sur. 554 (22 miles northeast of Rio Grande City). IP 6,000 M.c.f. daily, absolute open-flow potential, GLR 52.1 M.c.f. per barrel, 64.5°, shut-in tubing pressure 2,549 psi., perfs. 6,771-91 ft. TD 7,500 ft. (New pay in Yzaguirre field.)

Shell Oil Co. 5 Andres M. Garza-State, Sec. 218, Blk. 6, E. Range 1 Sur. (26 miles northeast of Rio Grande City). IP 56.13 BOPD (net), 4.8 per cent water, 9/64-in., 52°, GOR 837 cu. ft. per barrel, TP 750 psi., perfs. 6,992-7,006 ft. (Vicksburg), and (dual completion) 270.43 BOPD, 7/32-in., 53°, GOR 829 cu. ft. per barrel, perfs. 5,726-32 ft. (Frio). TD 7,100 ft. (New pays in North Rincon field.)

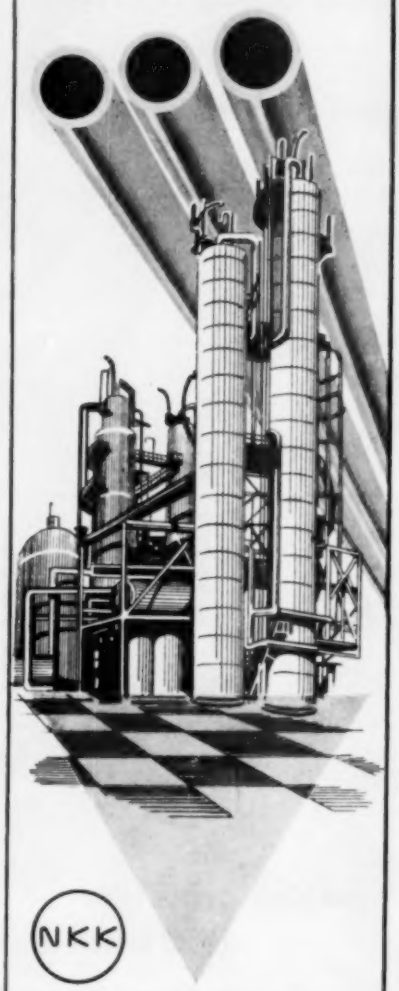
Sun Oil Co. 14-A Chapotal, Porcion 99 (5 miles east of Rio Grande City). IP 89.64 BOPD, 11/64-in., 45.3°, GOR 5,143 cu. ft. per barrel, TP 950 psi., perfs. 4,882-88 ft., 4,894-4,902 ft., and 4,909-13 ft. (Vicksburg). TD 6,730 ft. (New pay in Yturria field.)

TEXAS GULF COAST

DeWitt County: Harkins & Co., and George A. Musselman 1 Steinman, Henry Chamberlain Sur., A-123 (16 miles northeast of Cuero). IP 8,400 M.c.f. daily, absolute open-flow potential, GLR 100 M.c.f. per bbl., 60°, shut-in tubing pressure 2,018 psi., perforations 5,349-55 ft. (Yegua). TD 8,015 ft. (New field.)

Live Oak County: Republic Natural Gas Co. 1 Krietsch, Tract 30, Hagelstein Farm Tracts, Dilworth Ranch Subd., Juan Carroll Sur., A-4 (5 miles east of George West). IP 10,200 M.c.f. daily, absolute open-flow potential, GLR 23.4 M.c.f. per barrel, 46.8°, shut-in tubiing pressure 2,942 psi., perfs. 8,482-8,502 ft. TD 8,993 ft. (New field—East George West.)

Pipe & Tube
For Oil & Gas Industries



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Phillip E. Laughlin has succeeded where others failed. He is a . . .

Driller Headed for Argentina

A WEST TEXAS drilling contractor has accomplished something no other American oil firm, large or small, has been able to do for many years.

That was to negotiate a deal with Argentine authorities to participate in the country's drive to develop its oil resources—a deal, that is, that would stand up under scrutiny of the Argentine people's fierce nationalistic pride.

The prime mover in the negotiations was Phillip E. Laughlin, president of Laughlin-Porter Drilling Co., Inc., of Midland, Tex.

Laughlin hammered out a $3,000,000 footage contract with Argentina to drill 40 development wells on the island of Tierra del Fuego at the South American Continent's extreme southern tip (see International News). He accomplished this in about 6 months of negotiations beginning last April.

Laughlin-Porter won out over seven other contracting firms bidding for the work. The fact that it did this is a tribute to the personality, approach, and operational theories of young Laughlin.

The 36-year-old Laughlin is an alert but easy-going individual. He leaves the impression that he doesn't rush blindly into things. This much is evident in his views on the upcoming Tierra del Fuego operation.

The mere physical problems in carrying out the drilling program are monumental. Laughlin-Porter inevitably will suffer no end of headaches due to the island's lack of port facilities and paved roads, its mud, and its great distance from sources of supply.

Solving such problems could easily take up all the contractor's time and effort. But Laughlin is thinking of other things, too.

He thinks it vitally important that Laughlin-Porter and its personnel make a good impression, not only on Argentine officials but the people as well. He points out that the country no longer is ruled by a dictator, that the press is again free, and that public opinion again really means something.

Argentina, he says, has had a "keep out" sign posted for North American oil men and those of other countries for years. If Laughlin-Porter does its job well, it might go a long way toward reversing the country's historic adverse attitude toward foreign oil men.

In view of this, the important, hard-riding type of tool pusher is taboo for the Tierra del Fuego venture. The two rigs the company will ship to the island will be manned by Argentine crews with North American tool and tour pushers.

Laughlin amusedly says it's a bit difficult to find a diplomatic tool pusher but adds "that we have two now and will find the rest."

Being a Texan helps . . . Laughlin, already a veteran in the drilling business, is a son of one of the real old hands in oil, Phil E. Laughlin, who is still active as an independent in Midland.

The younger Laughlin has lived most of his life in Texas, the early part during his school years in Fort Worth. He credits this as being of considerable help in landing the Tierra del Fuego contract. "Argentines," he says, "like Texans. They consider them as being the equivalent in North America of the Argentine in South America."

Phil finished high school in Houston and 3 years of petroleum-engineering work at the University of Texas from 1939-1942 before volunteering for the Marine Corps.

He spent 4 years in the Marines flying a torpedo bomber in the Pacific. Following his discharge in 1946, he and his father moved to Brookhaven, Miss., to work independently in oil there. Three years later, both moved to Midland.

Young Laughlin formed Laughlin-Porter Drilling Co. in September 1951 with himself as president. Henry T. Porter, formerly a tool pusher for Loffland Brothers, is vice president in charge of operations. Phil's brother, Gary B. Laughlin of Fort Worth, is secretary-treasurer and is in charge of the Fort Worth office.

Since then, they have built up business to where the company now owns eight rotaries.

Howard D. Hartough, formerly assistant to the general manager of Houdry Process Corp., has joined National Cylinder Gas Co. as general manager of the Girdler catalyst department. He will be in charge of research, development, production, and application of catalysts in the company's Louisville, Ky., plant.

Norman P. Neureiter has joined Humble Oil & Refining Co. at Baytown, Tex. Neureiter recently received his doctor's degree from Northwestern University.

Logan D. Campbell, vice chairman of the board of Halliburton Oil Well Cementing Co., has been elected chairman, succeeding the late Erle P. Halliburton, founder of the company. **R. O. Shaffer,** president of Welex, Inc., subsidiary of Halliburton, has been named a director of the parent com-

Shell Companies Honored for Education Grants

L. A. Astley-Bell, right, president of Asiatic Petroleum Corp. and Shell Caribbean Petroleum Co., was one of six recipients of a Columbus Day citation, presented in Washington by the National Citizens Committee for Columbus Day. Dr. Jose A. Mora, left, secretary general of the Organization of American States, made the awards. The citation to Astley-Bell recognizes the work of the Shell companies in granting scholarships to Venezuelan students attending U.S. colleges and Shell contributions to the Inter-American Law Institute, which makes it possible for Latin American lawyers to take a graduate course in U.S. law at New York University.

pany. He will continue as president of Welex. Campbell joined Halliburton in 1926. He was elected a vice president in 1950 and vice chairman in 1953. No new vice chairman will be elected.

Thomas F. Edson has been named manager of General Aniline & Film Corp.'s new polyethylene plant at Linden, N. J., Edson has been a consulting chemical engineer for the past 2 years. He was vice president in charge of research, design, and plant construction for American Potash & Chemical Corp. before that time.

G. W. Mayben, assistant chemical engineer at American Oil Co.'s Texas City, Tex., refinery, has been promoted to associate chemical engineer at the company's Baltimore refinery. He will be responsible for economics, process design, and technical service there.

A. H. Meadows has shifted from chairman of the executive committee of General American Oil Co. of Texas, Dallas, to the board chairman position replacing **E. Wilson, Sr.,** who has retired. At the same time, the company's top executive position was switched from chairman of the executive committee to chairman of the board. New head of the executive committee and also a new director is **D. V. Loflin,** formerly production vice president. **L. P. O'Neill,** formerly vice president in charge of engineering, takes over as vice president of both engineering and production. **N. W. Krouskop** and **J. T. Reynolds** have been promoted to assistant vice presidents for production and **J. M. Haas** to assistant vice president for engineering. **W. Lewis Perryman, Jr.,** formerly vice president of the legal department, was named executive vice president.

H. J. Shumate has been appointed manager of foreign contracting for Loffland Brothers Co. Shumate has been contract representative in the West Texas-New Mexico division. He was with Gulf Oil Corp. before joining Loffland in 1956.

C. K. Whitney, senior mechanical engineer with Amoco Chemicals Corp. in Brownsville, Tex., has been transferred to Texas City as senior engineer with American Oil Co. Whitney was job engineer with Refinery Engineering Co. in Tulsa before joining Amoco earlier this year.

Personals

William R. Blackstock has been appointed manager of product development in Delhi-Taylor Oil Corp.'s chemical division, Dallas. Blackstock was formerly with Pittsburgh Coke & Chemical Co.

Charles Skarstrom, a process research physicist for Esso Research & Engineering Co., has been named a research associate. A graduate of Columbia University and the University of Virginia, he has been with Esso since 1942.

F. M. (Mac) Stewart, staff engineer with Pan American Petroleum Corp., **Myron L. Vance,** geologist with Mid-Continent Oil Co., and **O. Lewis Smith,** division petroleum engineer with Sun Oil Co., have joined the Tulsa office af Alex W. McCoy Associates, Inc. **William Slemko,** geologist for British American Oil Co., Ltd., has joined McCoy in Calgary.

A. J. Heiser, formerly of Green & Heiser Drilling Co., will join Brown Drilling Co. as vice president in charge of California drilling operations November 1.

William H. Wheatley, mechanical-engineering group leader for Amoco Chemicals Corp. in Brownsville, Tex., has joined Pan American Petroleum Corp. in Tulsa as staff engineer.

Roy M. Young, petroleum engineer, has been transferred to Houston from Midland, Tex., by Ohio Oil Co.

H. V. Alquier, tool pusher with Helmerich & Payne, Inc., has been transferred to Seminole, Tex., from McCamey, Tex.

A. M. Garber, consultant with Dutton-Williams, Ltd., in Calgary, has been transferred to Tulsa as production engineer with Williams Brothers Co.

Winston Glenn Smith has been appointed chief engineer for Austral Oil Exploration Co., Houston. **C. R. Geffs** has been named Texas-New Mexico district engineer for the company. In Austral's Lafayette, La., district office, **I. R. Chalmers** has been promoted to district production superintendent, and **Raymond Ellison** has been named district drilling superintendent.

Sidney C. Singer, Jr., senior project engineer at Shell Oil Co.'s Martinez, Calif., refinery, has been transferred to Shell Development Co.'s process engineering department in Emeryville, Calif.

Personals

LEE DANIEL

Lee Daniel has been elected vice president in charge of drilling for White Eagle Oil Co. Daniel will continue as vice president of Helmerich & Payne, Inc., drilling subsidiary of White Eagle, and as vice president of Helmerich & Payne, C.A., Venezuelan drilling subsidiary. In other appointments, White Eagle has named **Robert W. Haigh** as financial vice president and **Daniel R. Toll** as assistant to the president. Toll was formerly executive assistant. He will continue as vice president of Engineering-Construction Co., pipeline construction subsidiary.

Virgil A. Josendal has been promoted to senior chemist at the Brea, Calif., research center of Union Oil Co. of California. Josendal has been assigned to the company's production research division.

William C. MacQuown, chief geologist in Oklahoma City for Sohio Petroleum Co., has been transferred to Calgary as district manager. MacQuown replaces **R. D. Roberts,** who will transfer to Amarillo, Tex., as district exploration superintendent November 1. **Nolan Morse,** senior geologist at Amarillo, has been named district geologist there. In other Sohio production changes, **William H. Ward,** senior engineer in Oklahoma City, has been transferred to Tyler, Tex., as district engineer. **Richard C. Brown,** also senior engineer in reservoir engineering, Oklahoma City, has been transferred to Houston to join the Gulf Coast division engineering staff.

John C. Hunt, acting section head in Esso Research & Engineering Co.'s chemicals development division, has been appointed section head. **John F. Ryan** has been appointed an acting section head in this division. **John Rehner, Jr.,** has been appointed section head in Esso's products research division and **John F. Johnson** section head in the chemicals research division.

A. W. Baucum, general manager of The Texas Co.'s foreign operations department, has been named general manager of the foreign producing department (Western Hemisphere and West Africa). The department is a new one and consolidates all exploration and producing interests of Texaco in Canada, Latin America, and West Africa. Baucum, a graduate of Texas A. & M. College, joined the company in 1934. He was named assistant to the vice president, producing department, in 1950, assistant to the president in 1954, and became general manager of foreign operations department last year.

G. G. Billings, manager of operating services in Houston for Shell Pipe Line Corp., has been promoted to operations manager for the company. **J. E. Green,** technical specialist, will replace Billings as manager of operating services. Billings was manager of the West Texas area before becoming manager of operating services earlier this year. Green had been technical specialist in Houston since 1956 before his recent appointment.

H. E. Abernathy, tool pusher, has been transferred to Midland, Tex., from Andrews, Tex., by Empire Drilling Co.

Robert L. Heacock has been appointed Casper, Wyo., division paleontoligist for Shell Oil Co.

Robert G. Holmes has left Arabian American Oil Co., where he was design engineer in Ras Tanura, Saudi Arabia, to join Union Carbide Corp. in Niagara Falls, N. Y., in the same capacity.

Dr. Donald J. Bergman, chief engineer, Universal Oil Products Co., and **Dr. Herman S. Bloch,** deputy director of refining research for U.O.P., will receive awards of merit from the Chicago Technical Societies Council No-

H. S. BLOCK

D. J. BERGMAN

vember 7. The awards recognize contributions to science, civic affairs, and the Chicago community. It will be the first time that two men from the same company have received the honor.

J. D. Alexander, Crouch Oil Co.'s field superintendent in Orla, Tex., has been appointed district superintendent for West Texas and transferred to Ozona, Tex.

DEATHS

Ike P. LaRue, 61, president of Larco Drilling Co. and for many years one of the foremost wildcatters in East Texas and Mississippi, was killed October 17 in a hunting accident in Saskatchewan. LaRue, of Athens, Tex., maintained offices in Athens, Jackson, Miss., and Dallas. He started the first big oil play in Henderson County, East Texas, and made his first strike in the Boggy Creek section of nearby Cherokee County. He discovered Pistol Ridge field in Mississippi and later sold his holdings there for $3 million. He also discovered Bolton field and, more recently, a new field in Wayne County, Mississippi.

Claude A. Williams, 53, founder and former president of Transcontinental Gas Pipe Line Corp., was killed in an automobile accident October 17 near Stowell, Tex. Williams left Continental in 1953.

E. L. (Charlie) Fipps, 62, research geologist with Plymouth Oil Co., died October 20 in Sinton, Tex., after an illness of several weeks. Fipps had been with Plymouth for 20 years.

W. C. Stevenson, 58, vice president for industrial relations for Union Oil Co. of California, died October 21 in La Jolla, Calif.

William Henderson Pinckard, retired chairman of the board of California Texas Oil Co., died October 20 in Palo Alto, Calif. He was 63. Pinckard entered the oil business in 1917 with The Texas Co. In 1936 he helped form the Caltex group of companies. He was manager for Caltex in India before being named vice president of California Texas Oil in 1940. He was elected president of the company in 1946, chairman of the board in 1950, and chairman of the executive committee in 1954. He retired in April.

Edward A. Ryan, 93, Parkersburg, W. Va., pioneer in the oil and steel industries and president of Fresno Oil Co., Wichita Falls, Tex., died recently in Parkersburg. Ryan was one of the founders of both American Republics Corp., now a part of Sinclair Oil & Gas Co., and Petroleum Iron Works, later assimilated into U. S. Steel Corp. He was also a producer in the Ohio area at one time.

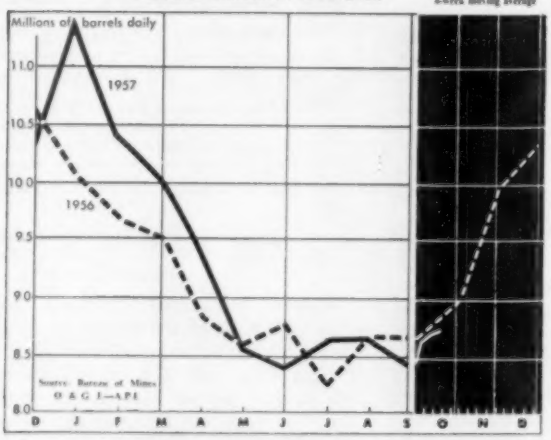
Paul W. Light, 76, Liberal, Kans., independent operator, died recently in Liberal.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,739,850	DOWN	975	DOWN	224,437
Crude stocks	283,314,000	DOWN	24,000	UP	3,856,000
Completions	1,100	DOWN	78	DOWN	13
Refinery runs	7,861,000	UP	117,000	UP	331,000
Gasoline stocks	179,263,000	UP	1,315,000	UP	6,176,000
Kerosine stocks	35,012,000	DOWN	834,000	UP	1,083,000
Distillate stocks	173,785,000	UP	1,102,000	UP	18,497,000
Residual stocks	58,823,000	DOWN	218,000	UP	11,108,000
Four-product stocks	446,883,000	UP	1,365,000	UP	36,864,000
Total imports	1,538,800	UP	73,000	DOWN	9,600

TOTAL DEMAND—ALL OILS



Operating Plans for Next Year Should Be Part of a Long-Range Program

THERE IS A DEFINITE NEED for more long-range planning and forecasting in the oil industry. The last quarter of the year normally is the time when production quotas and sales programs for the following year are worked out. But, next year's program should be fitted into long-range plans that may cover 5, 10, or 25 years.

Some of the producing fields in this country were discovered over 25 years ago. Some of the fields discovered this year will be producing 25 years from now. Some will be supplying oil after the start of the next century but at an ever-declining rate.

Many of the 1957 oil operators will not be active oil producers in the year 2000, but their present operations may well be the nuclei of large producing companies of the future.

It's not too early to start some basic planning. These plans should give consideration to factors that will influence production and demand for oil in the coming years.

In past years, demand for petroleum products has been relatively inelastic. Price changes have had very little effect on demand for oil. Demand for energy may continue to be inelastic in the future, but there are certain factors which could influence demand for domestic crude.

Without some restriction on crude imports, a price differential in favor of foreign crude will tend to increase the portion of foreign crude used. The big jump in crude imports over the past few years has shown that foreign crude could be delivered to coastal refineries for less money than domestic crude.

Even with protection in the form of high import duties or volume restrictions on imports, crude prices will be limited by competition from other forms of energy in this country.

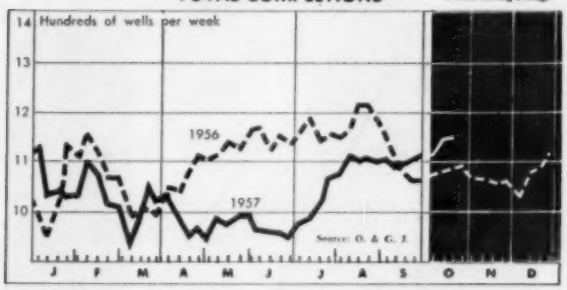
If the average price of crude went to $4 a barrel, based on the current value of the dollar, how much shale oil could be produced in competition with crude? At what crude price would coal hydrogenation be profitable?

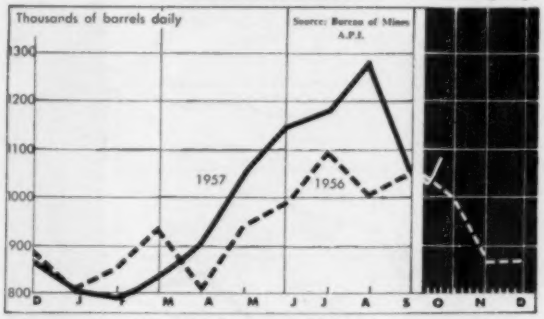
If conditions that permit $4 crude and profitable hydrogenation of coal are delayed until 1970, the problem will solve itself. By that time or soon after, this country's energy demand will create a market large enough to absorb all domestic fossil fuels.

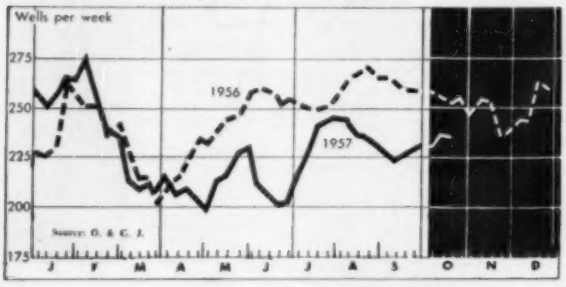
It may be difficult for the producer who is trying to estimate the number of producing days in Texas for 1958 to do some constructive thinking about demand in 1960 or 1975. But, it may pay off in the energy-hungry world of the future.

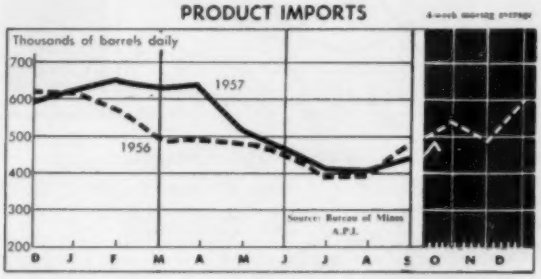
Product markets need cold weather . . . An extended wave of good cold weather would go a long way toward strengthening the product markets. Distillate prices at refineries would strengthen if secondary suppliers could start moving material to consumers. Cold weather also would cut the gas supply for industrial accounts with interruptible contracts. The shift to residual would tend to halt price reductions for that fuel.

Cold weather would even help gasoline. Distillate stocks have been so high this fall that some of the surplus material has been used as extra cracking stock for the production of gasoline. Cold weather would return yields to near-normal patterns.







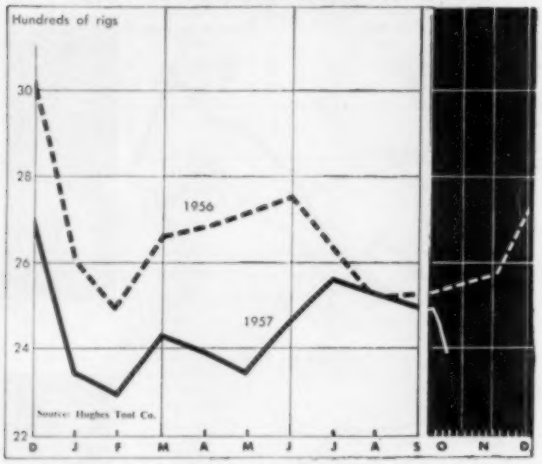


WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 19, 1957

	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1957	1956	Total	Crude	Cond.	Gas	Dry	1957	1956
Alabama	0	0	0	0	0	0	0	67	‡88	0	0	0	0	0	21	‡38
Arkansas	25	18	0	1	6	0	76,790	889	742	3	0	0	0	3	166	149
California	44	31	0	0	13	0	175,747	1,758	1,783	11	0	0	0	11	425	418
Colorado	27	1	0	9	17	0	142,846	686	967	15	1	0	0	14	452	514
Illinois	62	20	0	0	42	0	146,647	2,127	3,191	8	0	0	0	8	504	617
Indiana	15	6	0	0	9	0	27,357	526	556	3	0	0	0	3	106	114
Kansas	89	45	0	6	36	2	323,213	3,380	4,020	15	0	0	1	14	676	866
Kentucky	41	19	0	1	21	0	48,683	1,208	1,518	9	2	0	0	7	244	351
Louisiana	97	50	4	2	41	0	685,613	3,085	3,081	20	3	0	1	16	551	627
North	46	30	1	0	15	0	164,481	1,134	1,347	9	3	0	0	6	154	212
South	37	15	3	0	19	0	378,297	1,404	1,403	7	0	0	0	7	327	354
Offshore	14	5	0	2	7	0	142,835	547	331	4	0	0	1	3	70	61
Michigan	8	3	0	0	5	0	13,005	341	354	3	1	0	0	2	123	138
Mississippi	4	2	0	0	2	0	31,691	307	356	3	2	0	0	1	161	173
Montana	8	3	0	1	4	0	34,714	336	372	5	1	0	1	3	132	136
Nebraska	34	14	0	0	20	0	198,362	722	782	16	2	0	0	14	397	385
New Mexico	53	25	0	20	8	0	247,807	1,742	1,548	3	0	0	0	3	226	212
Northwest	32	7	0	18	7	0	136,018	736	691	2	0	0	0	2	88	74
Southeast	21	18	0	2	1	0	111,789	1,006	857	1	0	0	0	1	138	138
New York	9	4	0	0	0	5	9,250	372	....	0	0	0	0	0	7	....
North Dakota	5	4	0	0	1	0	40,076	228	211	2	1	0	0	1	103	61
Ohio	17	8	0	6	2	1	47,828	896	867	3	2	0	1	0	13	11
Oklahoma	124	70	3	7	42	2	453,957	5,156	6,732	19	1	0	2	16	603	712
Pennsylvania	0	0	0	0	0	0	0	517	†748	0	0	0	0	0	39	†22
Texas	390	215	4	9	157	5	1,522,045	17,540	17,872	86	2	0	0	84	4,184	4,558
Dist. 1	8	2	0	0	6	0	23,593	993	*2,559	6	0	0	0	6	342	*887
Dist. 2	15	6	1	1	7	0	100,263	613	*2,125	2	0	0	0	2	212	*704
Dist. 3	17	7	1	0	9	0	106,236	1,362	....	3	0	0	0	3	383	....
Dist. 4	19	7	0	1	11	0	100,072	1,135	....	5	1	0	0	4	368	....
East	33	21	1	0	11	0	93,508	1,091	932	10	1	0	0	9	315	334
Dist. 7-B	63	23	0	1	38	1	184,741	2,395	....	22	0	0	0	22	816	....
West	112	85	1	1	25	0	531,955	4,959	4,762	17	0	0	0	17	708	748
Dist. 9	96	46	0	1	45	4	256,990	3,832	*6,422	19	0	0	0	19	951	*1,786
Dist. 10	27	18	0	4	5	0	124,687	1,160	1,072	2	0	0	0	2	89	99
Utah	8	4	0	0	4	0	38,411	182	100	4	0	0	0	4	91	60
West Virginia	21	1	0	16	4	0	61,384	552	543	2	0	0	1	1	27	19
Wyoming	19	9	0	0	10	0	84,450	684	703	9	0	0	0	9	239	207
Miscellaneous	0	0	0	0	0	0	0	112	70	0	0	0	0	0	95	63
Total U. S.	1,100	552	11	78	444	15	4,409,876	43,413	47,204	239	18	0	7	214	9,585	10,451
Total prev. week	1,178	568	22	79	495	14	4,576,961	.....	.....	256	26	3	6	221	.....	.....
Cum. 1957	43,413	22,443	449	3,122	16,506	893	179,118,663	.....	.....	9,585	975	82	325	8,203	.....	.....
Western Canada	42	25	0	2	14	1	198,568	2,461	2,555	14	2	0	0	12	697	.....

*Districts: 2 & 3, 1 & 4, 9 & 7-B, formerly combined. †Incl. New York. ‡Incl. Florida and Georgia.

ROTARY RIGS OPERATING IN UNITED STATES



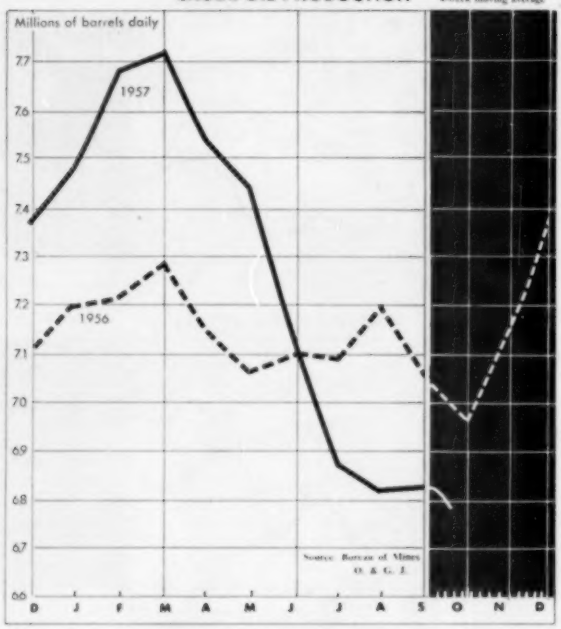
ACTIVE ROTARY RIGS*

Area—	10-21-57	10-14-57	10-7-57	10-22-56
Alabama	5	4	4	9
Arkansas	30	27	23	19
Arizona	1	1	1	1
California	87	90	95	114
Colorado	56	60	56	70
Florida	1	1	1	4
Georgia	....	....	....	....
Idaho	....	....	....	....
Illinois	47	63	61	73
Indiana	7	11	11	9
Iowa	2	2	2	1
Kansas	155	162	161	174
Kentucky	8	10	10	10
Louisiana	427	432	436	445
North	56	57	56	72
South	284	283	291	373
Offshore	87	92	89	(†)
Maryland	1	1	1	....
Michigan	11	11	11	16
Missouri	....	....	....	1
Montana	38	40	34	48
Mississippi	43	41	41	28
Nebraska	24	28	36	24
Nevada	....	....	....	1
New Mexico	144	139	141	131
New York	....	....	....	....
North Dakota	37	38	36	23
Ohio	1	....	....	1
Oklahoma	240	251	257	258
Oregon	1	1	1	....
Pennsylvania	13	13	11	6
South Dakota	1	1	1	....
Texas	859	876	898	985
Gulf Coast	173	178	196	245
Offshore	4	4	4	(‡)
West	350	351	359	369
North	287	283	280	310
East	45	60	59	61
Tennessee	....	1	1	....
Utah	62	66	71	30
Washington	1	1	1	1
West Virginia	3	3	3	2
Wyoming	78	78	83	69
Virginia	....	....	....	....
Total United States	2,383	2,452	2,488	2,553
Western Canada	181	165	190	225
Eastern Canada	3	3	3	....
Grand total	2,567	2,620	2,681	2,778

*Hughes Tool Co. †Included with South Louisiana. ‡Included with Texas Gu'f Coast.

CRUDE-OIL PRODUCTION

4-week moving average

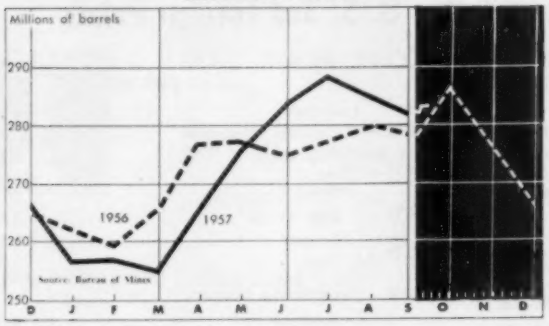


DAILY AVERAGE PRODUCTION FOR WEEK

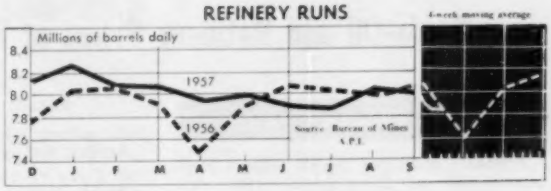
	October 19, 1957			Oct. 12
	Crude oil	Lease condensate	Total	total
Alabama	17,000	.....	17,000	16,550
Arkansas	81,050	300	81,350	81,625
California	933,700	.....	933,700	931,400
Colorado	143,400	.....	143,400	147,950
Eastern	54,000	.....	54,000	53,200
Florida	1,250	.....	1,250	1,250
Illinois	232,400	.....	232,400	234,600
Indiana	36,100	.....	36,100	36,600
Kansas	†328,000	.....	†328,000	†330,050
Kentucky	44,100	.....	44,100	44,400
Louisiana	725,400	77,500	802,900	812,200
North	110,400	2,500	112,900	122,200
South	615,000	75,000	690,000	690,000
Michigan	26,800	....	26,800	27,500
Mississippi	99,800	4,500	104,300	104,300
Montana	74,850	.....	74,850	75,250
Nebraska	55,200	.....	55,200	56,750
Nevada	150	.....	150	150
New Mexico	249,000	4,300	253,300	253,800
North Dakota	24,350	.....	24,350	28,650
Oklahoma	†569,500	.....	†569,500	†545,800
Texas	2,595,000	55,100	2,650,100	2,650,100
Dist. 1	48,000	500	48,500	48,500
Dist. 2	116,000	8,800	124,800	124,800
Dist. 3	374,000	26,800	400,800	400,800
Dist. 4	197,000	6,300	203,300	203,300
Dist. 5	32,000	300	32,300	32,300
Dist. 6	108,000	5,900	113,900	113,900
East Texas Field	155,000	.....	155,000	155,000
Dist. 7-B	143,000	75	143,075	143,075
Dist. 7-C	138,000	3,875	141,875	141,875
Dist. 8	982,000	1,400	983,400	983,400
Dist. 9	200,000	600	200,600	200,600
Dist. 10	102,000	550	102,550	102,550
Utah	11,300	.....	11,300	11,700
Wyoming	295,600	.....	295,600	296,800
Others	‡200	.....	‡200	‡200
Total U. S.	6,598,150	141,700	**6,739,850**	6,740,825
Change from prev. week, down			**975**	
Canada	†477,200	.....	†477,200	†405,400
Total U. S. production—Jan. 1-Oct. 19			2,113,971,550 bbl.	
Same period last year (crude plus cond.)			2,090,559,406 bbl.	

*Includes 35,896,680 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

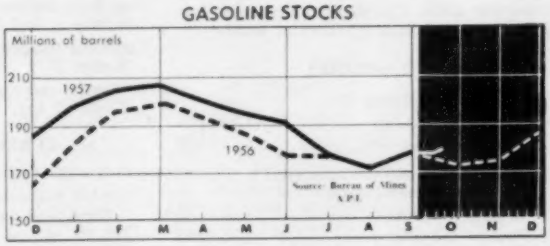
CRUDE-OIL STOCKS



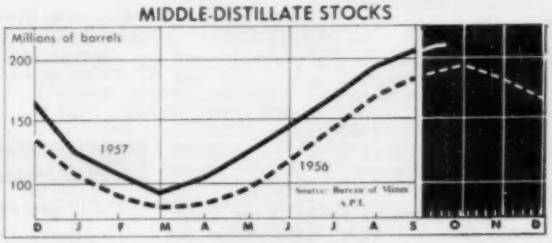
REFINERY RUNS



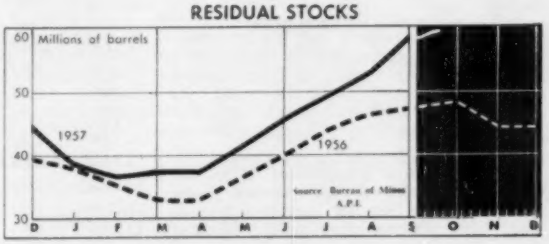
GASOLINE STOCKS



MIDDLE-DISTILLATE STOCKS



RESIDUAL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	10-12-57	10-5-57	10-13-56
Pennsylvania Grade	3,084	3,074	2,466
Other Appalachian	1,861	1,813	2,583
Illinois, Indiana, and Michigan	11,214	11,169	11,288
Nebraska and North Dakota	3,519	3,308	2,263
Kansas	10,411	10,501	9,753
Oklahoma	20,749	21,246	25,053
Arkansas	2,457	2,493	2,700
Louisiana	19,737	19,567	18,727
North	3,126	3,321	2,556
South	16,611	16,246	16,171
Mississippi, Ala., and Fla.	2,681	2,579	3,046
New Mexico	10,043	10,274	8,631
Texas	126,464	127,075	125,582
East Texas	9,769	10,400	8,580
West Texas	59,614	58,962	61,150
Texas Gulf	24,854	25,585	24,083
Other Texas	32,227	32,128	31,769
Wyoming	15,634	15,641	17,206
Other Rocky Mountain	5,973	6,098	6,518
California	32,247	31,919	28,648
Foreign	†17,240	16,581	14,994
Total	283,314	283,338	279,458

*Bureau of Mines. †Includes 5,452,000 bbl. in California.

A.P.I. REFINERY REPORT, OCTOBER 18, 1957

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1956—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,079	491.4	13.0	306.7	179.4	43,471	13,810	65,946	14,053	1,235	483.3	30.8	322.6	229.2
Appalachian:														
District 1	112	45.7	4.7	23.0	8.1	4,773	579	3,613	598	102	45.3	2.5	22.3	4.8
District 2	110	56.0	6.6	13.1	11.9	2,419	538	1,401	182	48	26.8	2.4	6.8	7.1
Ind., Ill., Ky.	1,455	733.9	63.6	305.0	162.8	30,597	7,175	25,156	6,061	1,271	662.9	53.8	254.2	139.9
Minn., Wis., Dak.	92	47.0	3.8	28.3	6.4	5,857	1,665	8,356	448	104	48.7	5.6	30.2	8.2
Okla., Kans., Mo.	740	399.6	13.6	177.3	34.1	14,160	1,908	14,196	1,077	728	405.0	11.8	160.3	28.1
Inland Texas	252	211.7	4.3	54.7	24.7	6,820	510	2,786	1,998	278	212.3	8.5	49.6	20.6
Texas Gulf Coast	1,847	937.3	105.3	423.7	225.3	24,318	3,889	20,168	7,721	1,854	904.1	77.6	471.7	241.6
La. Gulf Coast	656	364.0	24.3	169.2	47.0	11,077	3,309	9,330	1,732	668	361.1	45.5	169.0	45.3
N. La. and Ark.	96	41.1	8.3	19.3	5.4	4,388	906	2,332	211	97	34.7	5.6	22.4	6.7
Rocky Mountain:														
New Mexico	28	14.7	0.8	6.1	3.0	417	12	123	70	26	13.7	0.1	6.2	2.3
Other Rocky Mtn.	264	134.3	4.3	64.3	33.9	5,329	327	3,076	983	285	134.1	2.1	61.4	34.6
West Coast	1,130	485.6	3.7	138.0	331.1	25,637	384	17,302	23,689	1,156	500.5	2.7	172.9	321.2
Oct. 18, 1957	7,861	3,962.3	256.3	1,728.7	1,073.3	179,263	35,012	173,785	58,823	7,852	3,832.5	249.0	1,749.6	1,089.6
Oct. 11, 1957	7,744	3,909.0	265.1	1,771.6	1,044.7	177,948	35,846	172,683	59,041	.....	.....	.....	.....	.....
Oct. 19, 1956	7,530	3,665.4	396.0	1,711.3	1,106.0	173,087	33,929	155,288	47,715	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.50-11.75
Premium (98 octane)	14.25-14.50
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.00-11.50
Regular (92 octane)	11.25-11.75
Premium (97 octane)	12.75-13.25
Premium (98 octane)	13.00-13.50
California (rack):	
Regular (88 octane)	12.9
Premium (96 octane)	14.9
Premium (98 octane)	15.4
Caribbean area (cargoes):	
Regular (87 octane)	10.875
Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
★ Grade 26-70	4.5
Breckenridge:	
★ Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-10.00
Diesel oil (58 d.i. and above)	9.125-9.75
Distillate No. 1	9.125-9.75
Distillate No. 2	8.50-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.75-9.50
Distillate No. 2	8.75-9.50
New York Harbor (barges):	
Kerosine 41-43	10.75
Distillate No. 2	10.25
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.65-1.85
Gulf Coast (cargoes):	
Bunker C fuel	$2.50-2.75
New York Harbor (barges):	
Bunker C fuel	$2.95
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.85-3.00

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	28
200 vis. neutral (180 at 100°), 25 p.t.	26

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour) (§)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.81
16-16.9	2.74	....	....	....	1.86
17-17.9	2.78	....	....	....	1.91
18-18.9	2.82	....	....	....	1.96
19-19.9	2.85	....	....	....	2.01
20-20.9	2.89	$2.75	....	$2.62	2.06
21-21.9	2.93	2.77	....	2.64	2.11
22-22.9	2.97	2.79	....	2.66	2.16
23-23.9	3.01	2.81	$3.44	2.68	2.21
24-24.9	3.05	2.83	3.46	2.70	2.26
25-25.9	3.09	2.85	3.48	2.72	2.31
26-26.9	3.13	2.87	3.50	2.74	2.36
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour. §Most buyers are posting Wyoming sour in two schedules, 15°-26.9° and 27°-40°.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
Illinois Basin	3.15
Canada:	
Leduc-Woodbend	2.74
Redwater (Alta)	2.63
Smiley (Sask.)	2.40
Pembina	2.61

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.13
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 36.0°-36.9°, Fao	2.00
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.59
Iraq, 36.0°-36.9°, Tripoli, Banias	2.59
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC—32.5%)	$1.92
★ Gulf-U.S.N.H., dirty (USMC—27.5%)	2.07
★ Carib.-U.S.N.H., dirty (USMC —65.0%)	0.95
P.G.-Japan, dirty (USMC—52.5%)	4.28
★ P.G.-France, dirty (USMC—62.5%)	4.09

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PETROLEUM GEOLOGIST, Ph.D., 32, speaking English, German, French, Italian, wishes to associate with or represent oil companies, drilling contractors, consultants, investment groups or industries interested to extend activities to Europe and Eastern Hemisphere. Projects of some countries available. Box K-394, The Oil and Gas Journal, Tulsa, Oklahoma.

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Box K-408, The Oil and Gas Journal, Tulsa, Oklahoma.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 319.99 acres of land in one parcel within the known geologic structure of Garmesa Field, Garfield County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 2 pm., M.S.T., November 29, 1957, when bids will be opened. Details of the lease offering, how and where to submit bids, and forms, may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver, Colorado. George H. Woodhall, Manager.

LEGAL

SEALED BIDS will be received until 10:00 A. M., Mountain Standard Time, November 5, 1957, and opened at that time in the Office of the Fort Peck Indian Agency, Poplar, Montana, for the leasing of 11,894.06 acres of tribal and allotted Indian lands, located in Roosevelt and Sheridan Counties, Montana, for oil and gas mining purposes. The detail of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent Fort Peck Indian Agency, Poplar, Montana, or telephone, Poplar, 2161.

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